RAILROAD GAZETTE

FRIDAY, NOVEMBER 9, 1877.

Contributions.

Bridge Floors.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The valuable information contained in the *Railroad Gazette* of the 12th instant (referring to bridge inspection), brings to my mind a few suggestions which may be of interest to you in future articles on the subject.

The sketch for floor system with wood stringers, intended for an *iron bridge*, has been used by me on several bridges with satisfactory results, also a blank form used by master carpenters and inspectors, to fill out every month, with the date and condition of the bridge, all of which were placed on file for reference.

Guard timbers cannot be used higher than the rail, within 2¼ feet of the rail on roads where snow-plows are used; the top corners should be chamfered or rounded to remove the sap and bruises which decay in three or four years, and they will guide a wheel much better than a sharp corner timber. My experience, which dates back 20 years, leads me to believe that they should be 8 or 9 inches from the rail. If nearer, with a broad-tread wheel the timber would be forced outward and be of little use. Track stringers should have the top corners, which are exposed to the weather, chamfered one inch to remove the sap and bruises which are liable to be on heavy timber. It allows the water to drain off readily, and is a protection from fire. In nine cases out of ten fires originate on the edge of timber which is decayed or bruised. There should be a 2 in. space between the stringers as a protection from fire and decay. The separators or packing blocks between the timbers should be cast iron. Where wood is used it holds the moisture and causes decay, which cannot be seen from the outside, and can only be detected by boring. The run plank should be on the outside of the guard timber, which is a further protection from fire.

THOMAS HOLT.

JERSEY CITY, Oct. 15, 1877.

DIMENSIONS OF MATERIAL FOR BRIDGE FLOORS.

Centre-track stringers, Southern pine, 8 × 14 in., spliced on alternate beams.

Outside stringers, Southern pine, 6 × 14 in., spliced on alternate beams.

Cross-ties, white pine, 6 × 8 in. × 13 ft., planed to thickness, fastened to stringers with four 10 × ⅞ in. wrought spikes.

Guard-rails 6 × 8 in. fastened to every cross-tie with 7 × ⅝ in. coach screw and washer.

Two run plank, 1⅝ × 12 in., outside of the guard-rail.

Outside rail, 4 × 5 in., fastened to cross-ties with 7 in. cut spikes.

The chairs under the outside stringers should have slots in the flange of the beams to hold them in line, which will not weaken the floor beam, being near the ends.

The panels should not exceed 15 ft. for the stringers above mentioned.

[The blank form accompanying Mr. Holt's letter is headed "Bridge Inspector's Report." It has columns headed "No. of Bridge," "Designation of Bridge," "Date of Examination" and "Remarks," one line being given to each bridge in the inspector's district. It covers a single foolscap page.]

The Denver & Rio Grande Railway.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A little more than six years ago I rode into Denver, from Pueblo, in the daily stage. The coach held nine passengers inside, and there were two on the box-seat. That day the first tie was laid on the Denver & Rio Grande Railway. As a first result, within a year a town was built at Colorado Springs. It has shown itself to be permanent, and to-day contains probably 2,000 inhabitants. In 1873 I saw a town grow like magic on the desert plain at South Pueblo, and in the autumn there were shaded streets where in the spring cattle browsed on a gravelly plain with scarce a shrub to break the monotony of the view. In 1875 I drove from Fort Garland to Pueblo, over the Sangre de Cristo and Abeyta passes, and there was then not even a stage line running on this route. In October, 1877, I traveled, going and coming, over the same route in the daily trains of the Denver & Rio Grande, with perhaps 30 passengers going west and 20 going east on the same train with me, and this within three months after the line was opened for travel.

In the history of this railway there are certain points that seem to me not to have been brought out clearly, and I venture to suggest them.

The projectors of the scheme saw that a line of railway communication, north and south, was needed in the vicinity of the mountains.

Having the entire field to themselves, they studied the question carefully. They used that eminently American trait of thinking and acting for themselves; they used the best of what they found in the practice of others, and devised what else they needed to accomplish their own ends. They knew about what amount of traffic to expect; about what kind of freight they would have; exactly where they wanted their line to go, and exactly the kind of country to be passed through. The road bed and iron, the cars and engines, rates of speed and management of the road are all parts of a whole in this general design, and it would not be just to compare the items thereof with those of other roads, item by item, any more than to compare the street car with the omnibus, or the stage with the passenger car. They each serve their own ends. There is no "battle of the gauges," and the Denver & Rio Grande Railway should be judged as a whole.

The results of six years' experience has shown that it has been very decidedly a success, so far as the development of the country is concerned. It has been shown that the rolling stock works well and economically; the passenger cars are convenient and large enough for the travel; the freight cars have done what was expected of them, and it is now found that the entire equipment is in steady use. The road-bed stands well, and the iron and ties stand as much service as was expected. The iron used at first was 30 lbs. to the yard, and they are now using 25 lbs. steel. Pine ties in the dry climate last as well as ordinary ties in the East. The rates of speed withal are nearly if not quite as high as are maintained on the other roads running into Denver, and are now more than 40 per cent. higher between Denver and Pueblo than the rate first chosen on opening the line. Between these points the schedule time gives 21⅛ miles an hour, and the schedule time between the mountains and the Missouri of the Atchison, Topeka & Santa Fe and Kansas Pacific Railroads is a trifle less than 22 miles an hour. From Denver to Garland across the range the schedule time is over 16½ miles, and the ascent and descent are made with as high a rate of speed as is consistent with safety.

It would be difficult to say whether the railroad has built up trade or the trade has drawn to it the railroad, so carefully has the question been studied by the management of the road and so simultaneous have been the results. One thing is certain, that the trade is everywhere growing, has every appearance of being permanent, and the railroad has not gone beyond it. The recent extension across the mountains is a fine example of the policy of the road and its management.

The President, Gen. W. J. Palmer, to whom more than anybody else the road owes its being and its progress, studied the question of crossing the range into the Rio Grande valley for eight years, and in time made himself familiar with each possible pass or feasible line. His leisure time coming best in winter, it was a favorite time to try these high lines, and it was only after much work in the snow that he and Gov. A. C. Hunt, one of the board of directors, decided on the present line as the one to be used. In the final location of the line, uniform good judgment is finely exhibited, and probably nowhere in railroad work in this country can be found a better example of careful, exact and economical work than in the *selection* of this location. From La Veta to the Mule Shoe, eight miles, the grade of the road is that of the natural rise, and the line runs with a minimum of work, there not being a six-foot cut or fill in this part, and the line is remarkably direct. The toll road running beside it and crossing it time and again, rarely rises much above or falls much below the grade. At the "mule shoe" a sharp curve crosses the narrow valley by a fill through which runs the toll road, and the reverse direction is taken up the side of the Dump Mountain, which is a small mountain lying opposite and parallel to Veta Mountain, at the foot of which the road has thus far run. A cut made to gain distance before taking the "mule shoe" and the fill made at this point are the only pieces of work thus far met. The ascent of Dump Mountain is sharp and from here to the summit, about two miles, the grade rises at the rate of 175 to 217 ft. per mile, and the curves are short and sharp but not too severe. The work on the side of this mountain is all rock siding. The rock being sandstone and well joined, but little blasting was necessary. One or two short cuts are found. The road-bed is everywhere found to be good and not liable to slips or wash-outs. About half a mile of ascent of Dump Mountain brings the track to a point where it overlooks the prior part of the line, and at this point as the line sweeps around the point of the mountain to resume its western course the view down the valley towards La Veta is very fine. The remainder of the ascent follows the westerly course and the curves and the work grow less as the pass is reached. The altitude of the summit is 9,700 feet. The line here passes through timber for a mile or so.

The passenger train, of two cars and the baggage car, on the ascent passed a freight train of eight cars at a switch, and the freight started after the passenger train and reached the summit with apparently as much ease as it, and in as good time. The descent to Garland is more gentle than the eastern slope, and there is little curvature. There is very little more work on the road-bed than on the accompanying toll road, which is again joined.

Garland, at the edge of the San Luis Park, is only a temporary town, as the road will be extended this winter across the Rio Grande to the mouth of the Rio Alamosa, whence an outlook to the west, south and southwest and Arizona will be gained, and extension in either direction may be made when advisable. As a summary of the work exhibited by this crossing of the range, it may be said that it was entirely a question of grades and curves, to be adopted as desirable; and that a careful and ingenious location found the ground to be as well suited for such location as seems possible, and the railroad has been as nearly a natural line as could be found. Economy, stability and utility have been secured, and this part of the line is therefore eminently a good investment, and its construction gives credit alike to the engineer and to the management who took so prominent a part therein. "R."

Note on the Inspection of Bridges.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As a supplementary to your valuable hint on the inspection of bridges, allow me to repeat, and emphasize with a few words, two of your statements, viz.:

1. "A bridge inspector, to be thoroughly qualified for his duties, should have some knowledge of the nature of the strains to which the different members of the bridge are subjected."

2. "But even the most careful inspection will not atone for, or cure, radical defects in the first construction."

It is well known that many highway bridges are in use in the United States, whose capacities have never been calculated in any proper sense of the word; and it is not improbable that some railroad bridges are in the same predicament.

No inspection of such bridges, which leaves their capacities undetermined, can be deemed sufficient. Hence the inspector must take accurate dimensions of all bridges whose original margin of safety is not known to have been adequate to the service required. The determination of the greatest strains to be developed in each member of the bridge, by its own weight and that of the imposed loading, also the resisting power of each member, may be made by the inspector or may be delegated to another; but it must be made, before any complete report can be rendered on the safety of the structure.

To some minds it may seem absurd that a person should be charged with the inspection of bridges, who is unable to decide from his own observations and computings, whether a given bridge is safe or not. Yet, doubtless, such instances have occurred, and that too, without the summoning of proper mathematical aid. I say *proper* mathematical aid, for it sometimes happens that the capacity of a bridge for a given service is left wholly to the party constructing it; that is, to the party interested to have the factor of safety as small as "it will do" to have it.

Some years ago an engineer-in-chief on an important railroad in this country most frankly told me that he had not sufficient knowledge of bridges to compute their strength and form his own opinion of their sufficiency, and so he was wont to contract with bridge companies of good standing, and leave the matter of capacity entirely to the companies.

I admired the frankness of this engineer and was curious to learn how such a system would work. It was not long after this conversation that an instance illustrating the working of the system was brought to my notice. For the railroad company to which this engineer-in-chief belonged contracted with a bridge company "of good standing" for a bridge to span a Western river. The bridge was nearly finished when it was found that certain compression-members were visibly yielding to the pressure from the slowly moving traffic; and the builders were compelled to strengthen, in place, members which had been made smaller than "it would do" to have them.

Persons familiar with the specifications furnished by bidders for highway bridges are well aware that no uniformity of security is attained by them. One cause of this diversity in the specified strains is the weight assumed in the calculations for the bridge itself. In one case which came under my observation, ten bidders furnished their computed strains and specifications for a certain bridge. The following ten numbers are proportional to the bridge weights assumed in computing those strains:

1,000	1,388
1,053	1,428
1,118	1,524
1,123	1,652
1,215	2,008

And the greater part of these numbers had no apparent relation to the different designs proposed.

I may here add, as not entirely foreign to this subject, that some of the computers employed by those bidders had, wittingly or unwittingly, practiced the device to which I called attention in *Van Nostrand's Engineering Magazine* for April, 1877, viz.: that of treating apex-loads as if their sum was uniformly distributed over the entire girder. I again bring to notice this vicious practice, because I find it still in favor with some who are entrusted with the calculation of girder-strains.

It is not too much, therefore, to demand such thoroughness in the inspection of bridges that it may be certainly known whether any improper suppositions in the original calculations

Fig. 1

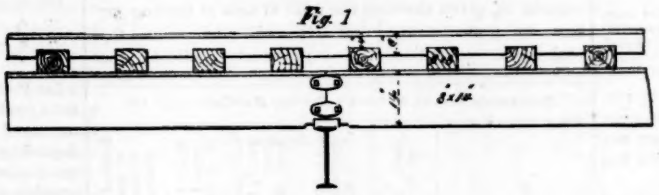
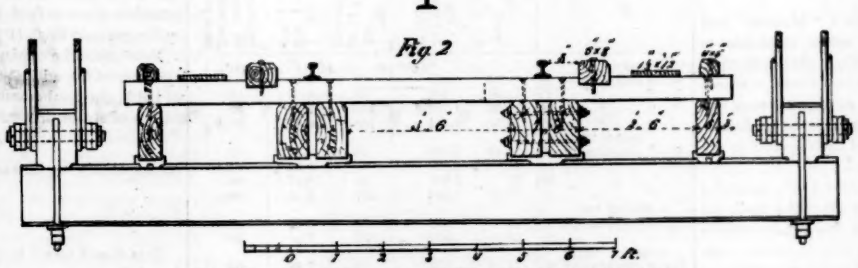


Fig. 2



GUARD TIMBERS, &c., FOR BRIDGE FLOORS.

Designed by Thomas Holt, C. E.

have conspired with bad workmanship and bad keeping, to render the "margin of safety" so narrow as to be perilous to the traveler. Yours truly, JOHN D. CREHORE.

CLEVELAND, Ohio, Nov. 1, 1877.

Most Economical Area of Grate.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Since reading your interesting editorial on page 416 of the *Railroad Gazette*, in which, after quoting Mr. Clark's statement as to a small grate being most economical, you proceed to give reasons for the same. I have looked carefully through Mr. Clark's "Manual" in order to see what data are given in support of the statement. Somewhat to my surprise the "Manual" seems to contain very few records of experiments bearing on this point, and those that it does contain hardly serve to confirm the statement above referred to. I understand the meaning of the statement in reference to the economy of small grates to be substantially as follows: That in a given boiler, in which a certain quantity of coal is to be consumed per hour, it can be burned most economically when the grate is as small as possible, or that, other things being equal, the smaller the grate, within practical limits, the more economical will be the performance. In Mr. Clark's "Manual" there seem to be only two sets of experiments made with the same boiler, with all conditions equal except the grate surface. They are as follows:

First set, page 788, experiments 9 and 12.

	Grate surface, square feet.	Coal per hour, pounds.	Pounds of water evaporated from 212°, per pound of coal.
Exp. 9	42	672	9.65
Exp. 12	33	672	9.25

Second set, page 796, experiments L and M.

	Grate surface, square feet.	Coal per hour, pounds.	Pounds of water evaporated from 212 per pound of coal.
Exp. L	8.64	179	8.03
Exp. M	6.48	178	7.43

(Although experiment N is included in this set in the "Manual," a reference to the work from which it was taken shows that the coal burned per hour was considerably less than in the other two cases.)

There are two other experiments in the "Manual," page 773, which are stated to be comparative, as follows:

	Length of grate, feet.	State of damper.	Pounds of coal per hour.	Pounds of water evaporated from 212° per pound of coal.
1st exp	6	⅝ closed.	448	10.10
2d exp	4	wide open.	464	10.91

With reference to these experiments, the following observation, from page 582 of Prof. Johnson's "Report on American Coals," may be of interest: "The lowest result from any given coal was generally obtained when the combustion was conducted with a damper partly closed."

After a careful examination of Mr. Clark's "Manual" and "Railway Machinery," I do not find any other experiments that can be compared with a view to settling this question. Unless some others can be produced from these works, it seems fair to ask whether Mr. Clark's conclusion as to grate area is a legitimate one. Of course, my search may have been defective, and if so, no one will be more pleased than myself to see the correction.

In addition to some experiments which point to the opposite of Mr. Clark's conclusion, published on page 433 of the *Railroad Gazette*, I beg leave to give a summary of two others, which seem to be of more than ordinary value, as they extended over considerable periods of time. The records of these experiments, made with a set of elephant boilers at a manufacturing establishment in Mulhouse, can be found in the *Bulletin de la Societe Industrielle de Mulhouse*, volume 39. The boilers as originally set had a grate 3.28 feet in width, and were tried for three months, under these conditions; then the grate was widened to 4.59 feet, and a record of the performance of the boilers was kept for two months more, the rate of combustion being approximately the same as in the former case. The following is a summary of the results:

	Width of grate, feet.	Time of trial, months.	Pounds of coal.	Pounds of water evaporated from and at 212° per pound of combustible.
1st. exp	3.28	3	304,161	9.23
2d exp	4.59	2	184,351	10.02

In conclusion, as you seem to be satisfied that Mr. Clark has made out his case, perhaps you will kindly furnish references to the corroborative experiments.

RICHARD H. BUEL.

No. 80 BROADWAY, N. Y., Oct. 12, 1877.

[On analyzing the experiments given in Clark's "Manual" and his "Railway Machinery," we find, as suggested by Mr. Buel, that they are not as conclusive as we at first thought they were in establishing the principle which he laid down "that practically there can never be too much heating surface, as regards economical evaporation, but there may be too little; and that, on the contrary, there may be too much grate-area for economical evaporation, but there cannot be too little, so long as the required rate of combustion per square foot does not exceed the limits imposed by physical conditions."

It must be kept in mind, however, that this principle was meant to apply to locomotive boilers only, and that it does not follow, because it is not true of stationary boilers with a slow combustion of from 16 to 27 lbs. of coal per square foot of grate per hour, that therefore it is untrue of locomotive boilers worked with a forced draft and with a consumption of from 80 to 120 lbs. of fuel per square foot of grate per hour.

But while the experiments quoted by Mr. Buel, especially those from page 796 of Clark's "Manual," and also the French experiments, seem to be very conclusive, yet there are others which indicate the reverse. On pages 792 and 793 are reports of experiments made with a coal-testing marine boiler at Keyham Steam Factory. Those made with the same kinds of coal and under the same conditions, as nearly as can be known from the report referred to, are arranged in groups in the following table:

Boiler Experiments from D. K. Clark's Manual, pages 792 and 793.

	Grate area, square feet.	Coal consumed per hour, lbs.	Water evaporated per pound of coal.
GROUP I.			
1st Experiment, 1st Series	14.	216.16	10.42
1st " 2d "	14.	233.98	11.05
1st " 4th "	10.5	236.32	11.31
GROUP II.			
3d Experiment, 1st Series	14.	215.04	9.81
3d " 2d "	14.	227.36	10.56
2d " 4th "	10.5	226 24	11.06
3d " 4th "	10.5	239.18	10.55
GROUP III.			
2d Experiment, 3d Series	14.	238.56	9.61
1st " 5th "	10.5	256.2	11.42
GROUP IV.			
3d Experiment, 3d Series	14.	244.16	10.54
7th " 3d "	14.	257.60	10.80
2d " 5th "	10.5	234.5	11.65

From these it will be seen that in each case the small grate gave the best results. The experiments were, however, made apparently to test the quality of different coals and not the efficiency of different sizes of grates, so that possibly the indications they give with reference to that question would not appear as conclusive as they do in the above table, if all the circumstances under which the experiments were made were known, which are probably stated in the report made to the Board of Admiralty, which Mr. Clark abstracted in his "Manual."

We have also arranged the experiments with locomotives given in Clark's "Railway Machinery" in similar groups, classifying them according to the quantity of coal consumed per hour in the grate. These experiments were all made with coke, excepting No. 59, in Group VII. They were made, however, with engines of different designs, and probably seldom under the same conditions. A column is given showing the ratio of area of heating surface to grate area, and it will be seen that with one exception the experiments indicate that

Experiments from D. K. Clark's Railway Machinery, page 156.

	Grate area, sq. feet.	Fuel consum'd on grate per hour, lbs.	Fuel consum'd per sq. ft. of grate per hour, lbs.	Water evaporated per lb. of coal.	Ratio of area of heating surface to grate area.
GROUP V.					
No. of experiment, 26	18.44	1,272	69	7.6	74
" " " 27	13.67	1,148	84	8.28	78
" " " 34	11.37	1,185	104	7.54	83
" " " 52	10.5	1,134	108	6.8	66.4+
GROUP VI.					
No. of experiment, 30	23.62	1,766	75	7.19	73
" " " 28	21	1,727	82	8 32	84
" " " 29	21	1.891	90	7.67	84
" " " 32	10.56	1,663	157	8.75	90+
GROUP VII.					
No. of experiment, 59	14.6	876	60	5.29	40
" " " 61	10.5	874	87	7.2	60
GROUP VIII.					
No. of experiment, 56	11.10	777	70	7.88	59
" " " 60	9.24	776	84	6.96	49+
GROUP IX.					
No. of experiment, 55	12.23	538.12	44	9.00	57
" " " 50	10 5	472	45	9.28	66.4
" " " 58	9.15	494.1	54	8.35	80.4+

the smaller the grate and larger the area of heating surface the greater the economy of evaporation. In experiment 52, Group V., it will be seen that the evaporation is less than in the case of the larger grates, but it will also be noted that the ratio of heating surface is only 66.4. In experiment 60, Group VIII., the small grate also gives the lowest evaporation, but its ratio of heating surface is only 49, instead of 59 in the other case. It must be kept in mind, too, that the mere fact of reducing the grate increases the *ratio* of heating surface. Thus with a boiler having 900 square feet of heating surface and 15 of grate the ratio should be of 60, but if we cover over the grate with dead plates, so as to diminish its area to 10 square feet, we will have a ratio of 90.

Experiment 58 of Group IX. shows a low evaporation with a high ratio of heating surface to grate area. Mr. Clark calls attention to this as being for some unexplained reason exceptional in its results.

But, as stated before, we are compelled to agree with Mr. Buel that the experiments are not conclusive, although indicating the soundness of Mr. Clark's proposition. It most not be hastily concluded that because his proof is not sufficient therefor the reverse of his statement is true. What is needed now is some exhaustive experiments to determine the question at issue. If we are obliged to wait long for this information it will be a serious imputation on the intelligence of the master mechanics of this country. The experiments are of the simplest kind and would consist of taking a good locomotive with a large grate and trying it with the full grate area, and then gradually diminishing its area with fire bricks or dead plates until the most economical size is ascertained.

As we took occasion to intimate a short time ago, it seems as though the practice of covering up the grate at the front end of the fire-box was wrong, especially if a fire-brick arch is used. We are inclined to believe that better results would be accomplished by leaving the grate open at the front end under the brick arch, and covering up the back part, and possibly the sides of the grate. Who will try the needed experiments?—EDITOR RAILROAD GAZETTE.]

The Steam-Chest Problem.

MEADVILLE, Pa., Oct. 27, 1877.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice in the *Gazette* of Oct. 26, a communication from Chas. E. Emery in which he calls for solutions of a steam-chest problem, etc.

At the joint of the steam-chest he supposes a strain of 7,200 lbs., acting downwards upon the steam-chest (the cylinder being horizontal with the steam-chest above), and upwards upon the cover and through it to the bolts.

At the first blush one might be inclined to think that the application of 3,600 lbs. of steam pressure, acting upwards upon the cover, would relieve just so much of the upward stress produced at the joint by reaction of strain upon the body of the chest, and that hence the total upward strain at the joint and upon the bolts would simply be 7,200 lbs., as before. But a little reflection will show that this cannot be the case. The material of the steam-chest is compressed a sensible amount by this original strain of 7,200 lbs.; the cover is likewise compressed, and the bolts elongated. Now in order that the steam-chest may cease to act upwards upon the cover by this full amount of strain, it is necessary that it be allowed to partially expand towards its original dimensions, and the room in which to expand can only be provided by a farther compression of the cover and extension of the bolts, *i. e.*, by a greater strain upon both, that while the strain upon the bolts is not increased by the full 3,600 lbs., it *is* increased by a very material amount.

To solve this problem even approximately would require more data than Mr. Emery has furnished us with, viz., the sectional area and length of bolts, the depth and sectional area of sides of steam-chest, and thickness of cover. I will, however, indicate generally the method of calculation:

Let e_b = extension of bolts by original strain of 7,200 lbs.
" e_t = compression of cover by original strain of 7,200 lbs.
" e_c = " " sides of chest by original strain of 7,200 lbs.

Let P represent the unknown additional strain upon the bolts produced by the steam pressure; then the additional extension of bolts due to this force will be a simple function of P, depending upon known section and length of bolts and modulus of elasticity which we will call $f(P)$; the additional compression of cover (not determinable with equal accuracy) we will represent by $f'(P)$.

Now, since the expansion of sides of steam-chest must equal the sum of the additional compression of cover and extension of bolts, the final compression of the steam-chest after application of steam pressure will be

$$e_c - f(P) - f'(P);$$

consequently the upward reaction will be

$$\frac{e_c - f(P) - f'(P)}{e_c} 7{,}200.$$

This strain added to the steam pressure of 3,600 lbs. must equal the strain upon bolts; hence

$$\frac{e_c - f(P) - f'(P)}{e_c} 7{,}200 + 3{,}600 = 7{,}200 + P,$$

from which P can be easily derived.

A number of years ago I had occasion to discuss a similar question in proportioning the parts of a hydraulic proving machine for 30-inch water pipes, for the Washington Aqueduct. The two points to be determined were: first, the movable cross-head having been screwed up against the pipe so as to produce a strain, W, and the water then pumped in producing a strain in the opposite direction, P, what was the strain upon the tie rods connecting the cross-heads? second, what strain W was necessary theoretically to produce a tight joint, so that water would not escape?

The problem was discussed both with and without wood packing at the ends of the pipe. The strain W produced a compression of screw, pipe, and packing, and extension of the rods; the pressure P modified all these alterations of length and consequent strains.

With a metal joint the ends of pipes and cross-heads must be supposed to be faced off. As the wood packing was likely to be strained beyond the limits of elasticity, the formulæ including its influence were less reliable.

The internal hydraulic pressure P was 258,000 lbs.; and it was found that the minimum force to produce a tight joint (with metal faces), W, was 196,600 lbs.; and for any strain W produced in the first place by the screw and exceeding this amount, the resultant strain upon screw and tie-rods would be W + 61,400 lbs.

Now in the case of a bridge, let us suppose we have a single panel lying on the ground on its side without strain upon any of its members Then screw up the counter brace, producing an equal tensile strain on main brace, and elongating both in an inverse ratio to their sectional areas. Now if we apply additional tensile strain directly to the brace, as occurs in the bridge in position, the counter will be relieved of a portion of its strain, but this can only take place by farther extension of and consequent greater strain upon the brace; so that while the resultant strain upon the brace will not be the sum of the two component strains, it will be greater than either. If the two diagonals are alike in section and the counter be screwed up to tension of 1,000 lbs., and then 1,000 lbs. be added directly to main brace, the final tension on brace (disregarding action of chords) will be 1,500 lbs., and on counter 500 lbs.

J. F. FLAGG, C. E.

Some Lessons from the Early October Storms—The Responsibility of Trackmen—Hints for the Season.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The list of railroad accidents for October will, unlike that for the preceding month, record numerous disasters from "washouts." On the 4th and 5th of the present month (October) portions of the Western, Middle and Eastern States were visited by a violent storm which caused a remarkable disturbance of roadbeds in its path. Although the accidents were numerous and some of them very destructive, the washouts were, as a general thing, confined to embankments and small culverts. While large bridge structures were not attacked by the flood in numerous instances, the storm seemed to have done a general business in a small way which in the aggregate is decidedly serious. In considering the result of the storm referred to and others of a like nature, the question naturally comes up, How many of these accidents might have been avoided? Perhaps it would not be far from the truth to say that all of them might have been prevented, but in the absence of facts in detail in each case, such an assertion would be extravagant. Doubtless, however, with the exercise of proper care and skill in construction, and a proper system of road inspection rigidly enforced, none of these accidents would have happened.

Perhaps there is no other part of railroad construction in which engineers are so often at fault as in securing sufficient waterway. Of course in "throwing" a railroad across a country it is easy to be deceived as to the proper size of a culvert, and contractors have a horror of large culverts. But if a culvert is not as *large* as it should be it may be a *soft* one. With good foundations and wing walls a culvert of somewhat cramped dimensions will carry an embankment through a rush of waters with safety if the passage is kept clear of driftwood, ice, etc. And here it may not be out of place to renew the hint heretofore given in these columns to trackmen of the importance of clearing streams of anything that may possibly float in high water and form dams in the stream or lodge in the culvert. And, during storms, the section men should be on hand to watch culverts and embankments until all is known to be safe, and the telegraph or torpedoes, the lantern or some effective signal, should be brought into requisition to stop trains in case of danger. It is when storms are raging that the trackman can render the most important service to the company, by saving life and property. To do this he must not mind being drenched to the skin, half frozen, half starved, with no sleep and no rest; he must hold out to the last, until all is safe. He does not know how many lives he holds in his hand; how many slumbering men, women and children may be suddenly brought to a horrible death if he allows his vigilance to relax for a moment. It matters not that instead of his monthly pay he only gets a notice that his wages are reduced 10 per cent., and that he has for many months past received these notices instead of his hard-earned scanty wages. This is a poor encouragement for a man to turn out of a warm bed on a stormy night, it is true; but when a man undertakes the charge of a section of railroad, he should accept the responsibilities in good faith and with a full knowledge of what is expected of him at all times and under all circumstances. But the track-man should be encouraged, *rewarded* for faithful service, and then *his employers have a right to expect it.* If a railroad company cannot afford to replace rotten wooden culverts with either masonry or iron, and protect its embankments in a substantial manner and pay trusty men to guard against accident, under present passenger rates and fine-cut freight rates, then let them come up to such rates as will send their workmen to the needed repairs and their paymasters around promptly every month. The traveling and shipping public would cheerfully submit to higher rates if they understood it to be necessary to secure greater safety. As it is the patrons who *support* the railroads, they would prefer to pay *fair* rates and have the roads kept up to a safe standard rather than be carried at greatly reduced rates in a constant fear of accidents.

Of late there seems to be an increase of failures or washouts of culverts; that is, ordinary rains or storms of no great violence cause frequent disasters at places that have withstood high water for years and been considered safe, and, consequently, not watched as closely as they should have been. The reason of this increase of accidents is, probably, that some years ago in the rush of railroad building much wood was used for culverts, and this timber has now become decayed to such an extent as to allow water to force its way back of the face of the walls through the rotten timber, by means of which the embankment is soon destroyed on the occurrence of a sudden rise of water. Old wooden culverts should be thoroughly examined and made safe. In many places where culverts require renewal iron tubes are preferable to masonry; and every culvert should be enough larger at the lower end to prevent trash from lodging, or, rather, gradually enlarged from its entrance its entire length, which will ensure a safe passage of ice, driftwood, etc. It frequently and we might almost say *always* happens that an accident from the failure of a bridge, or the washout of an embankment or culvert, comes where and when "not expected." This is because there was not a sharp lookout for causes and prompt and effective measures taken to avert the calamity. *With a knowledge* that the timber of a culvert were decayed, or that it was too small for high water, or that its foundation was of a washy nature, or that the embankments were unprotected with wall or riprap, and there was a storm raging, *then* a disaster might be *expected* and measures taken to prevent it. But if the condition of embankments and substructures *is not known*, as is frequently the case, then no trouble is expected, and accidents occur. It is as much the duty of trackmen to know the condition of culverts as it is to know where the defects in the track are, unless the road is in the charge of an engineering department, *and then* there should be an understanding as to who is responsible for the safety of the water-way in case of storms. Properly every road should have an engineering department in its organization, and that should be responsible for the safety of all water-ways and substructures. Now is the time for engineers and roadmasters to look after water courses. Ditches should receive a thorough cleaning before winter sets in, that they may be in good condition for spring service. Embankments that are in a doubtful condition as to the possibility of their being disturbed by a spread of surface water, or water in the regular channels, should be protected now. Old ties may be used for such purposes to good advantage where rubble is not plenty. Snow fences need looking after and snow plows to be brushed up and put in working order. Water tanks and fixtures need looking after, that Jack Frost may not shut off the supply. Piles of ballast should be leveled down, and the wood and lumber and old ties, or anything that may interfere with or obstruct the passage of snow plows, removed. And don't forget to get a good line and surface on the track before it freezes up; and if a thorough "policing" was done before winter sets in there would be less accumulated rubbish with which to burn wood-sheds, round-houses and other buildings next spring. The fine days in late autumn are a good time to burn heavy crops of weeds, dead grass and brush that have been neglected along the roadsides, and which if left until spring will take fire from sparks and run wild. Attend to it now, and you will save miles of fences and some bridges and other property next spring.

WM. S. HUNTINGTON.

THE SCRAP HEAP.

A Remarkable Locomotive.

The Dunkirk & Warren road has an engineer who is remarkably gifted in opening a wide throttle and crowding on a full head of steam in his recital of railroad exploits. "Yes," he said the other day to a circle of credulous listeners, one of whom had set his safety-valve a little tighter than the regulation pressure in bragging of his engine—"yes, your engine would be a pretty good one, but it needs repairs; take her into the shops and have them jack up the whistle and put a new machine under it and she would run all right; but speaking of real smart engines, of engines that can get right up and crawl away from a whirlwind and stop and back up inside of three-quarters of no time at all, there was old 310 I used to run when I was out West. She was considerable heavy, weighed about seventy-five tons, but she *was* active. Why I remember running along one day, and the water got low in the tender, and I forgot all about it till I got within a hundred feet of the water tank. I had upward of sixty loaded cars, and we were just streaking it at forty miles an hour. I didn't think she would do it, but I whistled for brakes, let out the sand and reversed her, and you ought to see that engine wrestle the rails. She tore awful and stopped at that tank exactly. Well, we took water and I pulled up to the next station, and there was a dispatch from the last station wanting to know where in the infernal regions the track had gone to. It had pulled up and disappeared up the right of way like a whip lash. And while I was waiting there came another dispatch from up the road saying the track was all doubled and twisted against a switch house there. I'm blessed if we hadn't stopped so sudden as to push seven miles of track along the road and break all the connections behind us. Yes, she was a quick one," said he softly to himself. "I had an engine once that the reverse lever was so long that when you went over with one end of it and got her set you found you had been gone just two days."

"I left that road, though," said he, "when they sold old 310 to a Peruvian railroad, and I couldn't bear to run over the old ground without her." "What did they want with such a heavy engine in Peru?" said one of the listeners. "Why, you see," said he, "they're troubled so much with earthquakes tearing up the track there that they just bought her to hold them down."

The other engineers rose hastily to go out and one of them was heard to mutter as he stopped to light his pipe, "That George Dicks is a nickel-plated, good-draft, double-exhaust liar, I think."—*Dunkirk Journal.*

Fast Time.

The Sothern theatrical troupe has been making another fast run, this time from Boston to New York by way of the New York & New England and the Boston & New York Air Line. The train was a special and left Boston at 1.04 p. m., reaching New Haven at 4:36 and New York at 6.48 p. m. The run of 140 miles from Boston to New Haven was thus made in 3 hours 32 minutes being 39.6 miles an hour; the 74 miles from New Haven to New York in 2 hours 12 minutes, or at 33.6 miles an hour. The whole run of 214 miles took 5 hours 44 minutes, an average of 37.3 miles an hour. The number of stops was not given. The ordinary express time by this line is 7½ hours.

LOCOMOTIVE RETURNS, JUNE, 1877.

Master Mechanics of all American railroads are invited to send us their monthly reports for this table.

NAME OF ROAD.	Number of miles operated	Number of Locomotives in service	Mileage. Total	Mileage. Average per Engine	No. Miles run to Ton of Coal	No. Miles run to Cord of Wood	No. Miles run to Pint of Oil	Average No. of freight cars hauled	Average cost pr freight car per mile, cents.	Cost per Mile in Cents for Repairs	Fuel	Stores	Miscellaneous	Engine'rs, firemen, and wipers	Total	Av. c'st of Coal, per ton or bushel	Av. c'st of Wood per cord
																$	$
Allegheny Valley (River Division)*	139	...	94,474	.....	39.17	....	22.23	20.40	0.955	7.28	3.41	0.60	....	6.16	17.45	....	....
" " (Low Grade Div.)*	110	...	43,789	.....	9.48	....	22 64	21.10	0.820	3.53	4 16	0.64	.....	6.07	14 40	....	....
Atlantic & Great West'n (1st & 2d Divs.)†	228	83	231 592	2 791	41.12	....	17.62	.....	.....	4 32	4.89	0 51	0.60	6.14	16 46	1 88	2.83
" " (Third&Fourth Divs.)†	197	48	105.176	2,191	41.12	....	21.23	.....	.....	4.71	4.89	0.36	0.81	5.91	16.68	1.88	2.83
" " (Mahoning Division)†..	88	54	125,179	2.318	41.12	....	19.74	.....	.....	2.80	4.89	0.41	0.45	5.81	14.36	1.88	2.83
Atlantic & Gulf	343	20	43,783	2,189	..	64 83	19.06	.	.....	8.30	3.80	0.41	.....	8.42	20.96	.	2.46
Cairo & Vincennes	157	11	24 092	2,190	49.90	.....	15.90	.....	.....	5.20	3.16	0.33	.....	5.51	14.20	1 50	....
California Pacific	152	11	25,707	2 337	42 73	60.22	23.08	8.80	.....	8.10	13.91	0.51	0 56	7.57	30.65	6.00	5.25
Camden & Atlantic	67	12	23 436	1 953	54.70	.....	12 15	.....	.....	4.01	7.20	1.01	.....	5.28	17.50	3.92	....
Central Pacific (Western Division)‡	201	55	135,747	2,468	37 58	.....	19.62	.....	.....	7.55	18.73	0.55	0.58	7.83	35.24	7 00	5.00
" " (Visalia Division)‡	157	12	32,530	2,711	59.41	.....	19 69	.....	.....	4.20	11 84	0.50	0.10	7.15	23.79	7.00	5.00
" " (Tulare Division)‡	171	10	24.217	2,422	38.25	..	12.46	.....	.....	3.43	18.38	0.80	0.19	7.91	30.71	7.00	5.00
" " (Los Angeles, Yuma, San Diego and Wilm. Divs.)‡.	391	18	47.752	2,653	54.19	.	16.16	.....	.....	3.61	12.99	0 64	0.09	7.50	24 83	7.00	5.00
" " (Sacramento Division)‡..	120	38	89.949	2 367	.....	27 93	18 22	.....	.....	9.28	17.96	0.58	0 33	9.16	37.25	.....	5.00
" " (Oregon Division)‡	152	7	17 977	2.568	..	9 77	20.36	.	.....	4.28	12.57	0.55	0 24	8.50	26.14	.....	5.00
" " (Truckee Division)‡.	205	27	59 300	2,196	39 19	27.76	17.78	.....	.....	6.91	17.97	0.57	0.52	8 88	34.85	7.00	5.00
" " (Humboldt Division)‡	201	20	46,251	2.313	47.16	.	19.47	.....	.....	9.96	14.91	0.53	0 43	7.70	33.53	7.00	5.00
" " (Salt Lake Division)‡	219	27	69 686	2,581	35.38	.....	17.95	.....	.....	3.95	19 85	0.69	0.53	7.32	32.34	7.00	5.00
Cleve., Col., Cin. & Ind. (Col'bus Div.)..	138	60	154.273	2,571	49.59	52.00	30 08	.....	.....	2.80	4.02	0.47	0 64	6 06	13.99	1.75	3.50
" " " (Indianapolis Div.)..	203	64	168 475	2.632	44 52	44.83	21.54	.....	.....	3.80	4.63	0 59	1.27	5 77	16 06	1.75	3.50
" " " (Cincinnati Div.)...	130	35	75.968	2 302	43.34	....	22 46	.....	.....	3.64	4.34	0.55	0.91	5.96	15 40	1.75	3.50
Cleveland & Mahoning Valley	41	6	17,176	2.863	61 12	.....	24 29	.	.....	2.59	3.25	0.38	0.99	6 00	13.21	1.83	2.76
Cleveland & Pittsburgh*	199	75	165,478	2,206	52.76	.....	19.95	17.10	0 814	3.88	2.68	0 50	1.86	6.16	15.08	1.21	3.24
Del., Lacka. & West. (Bloomsburg Div.)§	80	23	53.680	2,343	.....	....	31.03	.	.....	2.11	.....	8 61	....	5 2.	7 94	.....	.....
Erie & Pittsburgh*	98	28	57,929	2,069	46.03	....	16.20	18.10	0.838	3.83	3.51	0.69	1 88	6.34	16 25	1.61	1 61
Hannibal & St. Joseph	296	....	135,802	.....	38.91	..	20.55	.....	.....	3.84	5.46	0.36	.....	6 70	16 36	2 00	3.00
Illinois Central (Chicago Div.)‖	253	54	139.705	2,587	41.40	..	17.04	20 23	.....	4.15	4 95	0.27	.....	5 90	15.29	1.90	4.50
" " (South Div.)‖	231	29	68,866	2,375	44.28	.....	15 88	13 13	..	6.24	4.60	0.30	.....	5 77	17.01	1 90	4.50
" " (North Div.)‖	225	32	72,236	2,257	38.15	.....	17.03	15.48	....	5.45	5 31	0.30	.....	5.97	17.03	1.90	4.50
" " (Iowa Div.)‖	401	40	85,845	2,146	40.68	.	19 26	10.81	.....	4 74	7.03	0.26	.....	5.98	18.01	2.75	4.70
Jeffersonville, Madison & Indianapolis*	226	41	85 505	2,085	48.72	25.43	15.23	19 41	0.880	3.18	5 40	0.45	1.80	5.79	16.63	2.50	2.20
Kansas Pacific and controlled lines¶	914	74	154,828	2.092	31.52	....	13.57	.....	.....	5.36	14 77	0.43	....	6.96	37.52	4 58	6.06
Kansas City, St. Jo. & Council Bluffs**	375	28	84,177	3,003	61.80	.	28.20	14.60	.....	5 00	4.80	0,40	.....	6.60	16.80	2 80	3.50
Lake Shore & Mich. So. (Buff. Div.)††	.....	90	154.663	1,718	42.79	46.14	.....	.....	.....	5.08	7.49	0.36	.....	6.35	19.31	3.05	5.69
" " (Erie Div.)††	.....	113	209 561	1.854	44.97	.....	.....	.....	.....	5 42	6.34	0.33	.....	5.83	17.95	2.71	5.43
" " (Toledo Div.)††	.....	85	118,815	1,397	34.38	56 02	...	.....	.....	5.72	8 97	0.41	.....	6.05	21 17	3.12	4.08
" " (Mich. So. Div.)††	.....	207	341 587	1,650	40.45	64.16	.....	.....	.....	6.16	8.47	0.29	.....	6.40	21.18	3.55	4.63
Missouri, Kansas & Texas‡‡	786	68	209.528	3 079	32.83	....	10.36	15.30	1.250	4 27	6.92	0.68	...	5.69	17 56	2.26	....
North'n Cent'l (Elm. & Comand'gua Div.)	147	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania (New York Division)§§	120	117	269,441	2 303	36.83	....	11.42	.....	.....	6.60	8 50	1.20	.....	.....	16.30	3.00	5.44
" (Amboy Division)§§	154	46	77,034	1,675	59.40	.....	20.16	.....	.....	4.90	5.20	0.50	.....	.....	10.70	3.00	5.44
" (Belvidere Division)§§	163	37	58,392	1 578	40.16	....	15.72	.....	.....	7.40	7.60	0 90	.....	.....	16.90	3.00	5.46
" (Philadelphia Division)§§	191	284	380,940	2 070	29.51	....	14 84	.....	.....	5.90	4.30	0 80	.....	.....	11.00	1.20	2.64
" (Middle Division)§§	132	90	255,967	2.844	31.86	....	20.41	.....	.....	6.40	3.99	0.60	...	...	10.90	1 20	2.64
" (Pittsb'gh Div., E. End)§§	.....	73	143,277	1.965	22.14	....	12 08	.....	.....	4.70	5 60	0.80	..	.....	11.10	1.20	2.64
" (Pittsb'hDiv.,West End)§§	.....	101	227 924	2,257	37.33	....	15.53	.....	..	9.30	3 30	0.70	.....	.....	13.30	1.20	2.64
" (Tyrone Division)§§	107	28	55 889	1 996	22.47	....	23.04	.....	.....	7 30	5.60	0.60	.....	.....	13 50	1.20	2 63
" (West Pennsylvania Div)§§	104	22	40,939	1,861	42.66	....	36.50	.....	.....	7.00	3.10	0.30	.....	.....	10.40	1.20	2.64
" (Lewistown Division)§§..	56	7	9 118	1,303	39.23	....	18.32	.....	.....	2.10	3.20	0.50	.....	.....	5.80	1.20	2.71
" (Bedford Division)§§	57	5	8 476	1.695	32.19	....	23.64	.....	.....	16.40	3.80	0.40	.....	.....	20.60	1 20	2.76
Pitts., Ft. Wayne & Chi. (East'n Div.)*	371	149	318,724	2 139	52.45	....	17.15	14 60	0.992	3 60	2.97	0 70	1.65	6.27	15.19	1.56	1.56
" " " (Western Div.)*	280	112	219 310	1.958	55.40	....	18.60	22 00	0.806	4 35	3.28	0.41	1.94	6.15	16 13	1.82	1.82
Pitts., Cin. & St. L. (Little Miami Div.)*	197	37	92.991	2,513	45.50	....	12.58	17.06	0.836	3.45	5 97	0.70	2.98	5.68	18.78	2.63	2.00
" " " (Pitts.Cin. & St.L. Div.)*	224	75	191,258	2,550	34.25	....	15.65	18.86	1.230	8.62	3.48	0 61	2.69	5 95	21.36	1.05	3.00
Pittsburgh, Titusville & Buffalo*	158	....	54 260	.....	38.96	....	18.31	17.00	1.035	4.08	4.76	0.64	.....	6.14	15.62	.....	.....
St. Louis, I. M. & So. (Arkansas Div.)....	325	32	72,145	2.255	.....	54.10	16 90	.....	.....	2.59	4.52	0.53	.....	6.51	14.15	.....	2.42
St. Louis & San Francisco††	328	....	68 896	.....	35.40	....	14.90	.....	.....	3.34	6.18	0.32	.....	5.58	15.42	2.20	2.15
St. Louis & Southeastern (St. Louis Div.)	210	....	49,854	.....	56.70	....	16.30	.....	.....	4.80	2.60	0.40	.....	6.10	13.90	1.32	....
" " (Nashville Div.)	146	....	41,514	....	42 50	....	15.80	.....	.....	5.00	2.30	0.30	.....	6.40	14.00	0.87	....
Stockton & Copperopolis	49	3	3,288	1 296	44.25	83.14	17.28	.....	.....	10.64	7.11	0 63	0.85	9.08	28.31	5.00	3.00
West Jersey §§	128	19	40.432	2,128	47.95	.....	19 31	.....	.....	4.80	8.00	0.60	.....	.....	13.40	3.80	4.89
Half year ending June 30:																	
Cleveland, Columbus, Cincinnati & Indianapolis (Columbus Div.)	138	60	951,758	15,862	45.52	66.66	30.62	.....	.....	2.79	4.34	0.53	0.75	5.84	14.25	1.75	3.50
Cleveland, Columbus, Cincinnati & Indianapolis (Indianapolis Div.)	203	65	1,087,606	16,732	43.04	42.80	22.69	.....	.....	3.73	4.76	0.62	1.40	5.58	16.09	1.75	3.50
Cleveland, Columbus, Cincinnati & Indianapolis (Cincinnati Div.)	130	35	465,289	13.294	39.51	.....	22.36	.....	.....	5.25	4.79	0.58	0 93	5.94	17.49	1.75	3.50

* Five empty cars rated as three loaded ones.
† Fuel averages are for the whole road.
‡ Switching engines allowed 6 miles per hour; helping engines actual distance and 4 miles per hour while waiting trains.
§ Fuel not estimated.
‖ Two empty cars rated as one loaded one.
¶ Switching and work train engines allowed 6 miles per hour.
†† Switching engines allowed 6 miles per hour.
** Three empty cars rated as two loaded ones.
‡‡ Water service (not included above). 0 90 ct. per mile; rental of engines, 0.39 ct. per mile; three empty cars rated as two loaded ones; switching and work train engines allowed 6 miles per hour.
§§ Engineers', firemen's and wipers' wages not included in cost.
The ton of coal is 2,000 lbs., unless otherwise noted; 25 bushels counted to the ton.

RAILROAD GAZETTE

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S. WRIGHT DUNNING AND M. N. FORNEY.

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Editorial Announcements.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

THE PARIS EXHIBITION.

Unfortunately for American interests, Congress during its last session did not formally accept the invitation of France to take part in their international exhibition of 1878, and without such acceptance our citizens could not be represented there. It seems quite certain now that Congress, at this late period, will take action, and that a commission will be appointed and provision be made for the transportation of goods to and from the exhibition. Although not so much can be accomplished, in the time which remains, as could have been if Congress had acted earlier, yet if our manufacturers are prompt there is yet time to prepare a creditable representation of the industries of this country in the exhibition next year. Public attention seems to be directed to the subject now, and the daily papers inform us that Secretary Evarts has recommended that an appropriation of $225,000 be made to provide for an American display on that occasion. He suggested besides that provision should be made for transporting intended exhibits from the interior to the seaboard. It is said, too, that the committee of Congress having the bill in charge will hold daily sessions until it is completed, and will then report it for passage at the first opportunity; so that we may confidently look for the required legislation at an early date. The committee, however, proposes to make the appropriation but $150,000.

The question then comes up, what will the manufacturers themselves do? Those addressed by the *Railroad Gazette* are directly or indirectly engaged in supplying material or machinery to railroad companies, and what we have to say will naturally be addressed to them.

Our own Centennial of last year revealed to us that there was a large foreign market which might be supplied from this country if the proper effort were made to reach it. Our own war, with the demands which it created and the waste which it occasioned, had for ten years or more so absorbed our energies that but little attention was given to foreign markets. The depression which has since followed and the stagnation which prevails, almost universally here and abroad, has quite naturally led us to look in every direction for markets. The columns of the *Railroad Gazette* now give almost weekly indications of the foreign business which has been developed, largely by the visits of foreigners to this country last year, and no department of our industries seemed to excite so much interest in foreigners as our railroad system. Unlike that of Europe, it was originally adapted to the wants of a thinly-settled country, with comparatively little business and less capital to expend. It is therefore better adapted to the wants of such countries and communities as are found in nearly all the European colonies and in the semi-civilized parts of the world. For this reason we have, since 1876, been exporting more locomotives, cars and railroad supplies of all kinds than ever before. Orders come from the antipodes, locomotives are shipped to New Zealand, Australia and Brazil, and agricultural machinery to almost all parts of the world. Now most of these results have been accomplished simply by making foreigners acquainted with what we have been doing. It may be said that so far as attracting foreigners to this country is concerned, our own exhibition was only partly successful. There were, it is true, more distinguished foreigners, especially engineers, here then than ever before, but, in all probability, the number of visitors to Paris of that class, from all parts of the world, will be many-fold greater than it was here. The opportunity of making our own productions known will therefore be very much better there than it was here, and if those who are engaged in the industries referred to were properly represented at Paris, they would undoubtedly accomplish more, in the way of making our methods of constructing railroads known abroad, than they did at the Centennial last year.

A call has been issued for a meeting of manufacturers, merchants and other citizens to be held in the Main Building of the Centennial International Exhibition in Philadelphia, on Thursday, the 15th day of November, "for the purpose of securing a full participation by the people of this country in the International Exhibition in Paris." Probably what will be accomplished there will be only of a general character, and no specific plans or arrangements will be made for the representation of any special class of industries. The object will chiefly be to awaken public interest in the subject, which is of course very desirable; but what seems to be specially needed besides this—and has been suggested before in these columns—is the organization of special branches of industries, so as to secure a complete representation of all that pertains thereto. Thus, if the manufacturers of railroad machinery and material should organize and appoint a committee whose business it would be to devise a complete system of exhibits of all that relates to the construction and operation of our railroads, and having done so, would make some efforts to induce those who produce the different articles which are supplied to railroads to exhibit them, there might be a representation made at Paris which would attract the attention of the whole world. Thus, to begin at the beginning, there would be the instruments for the location of railroads - transits, levels, chains, rods, etc.; then the machines for their construction—shovels, picks, hand and steam drills, steam-shovels, excavators, portable railroads and pile-drivers; the permanent works, to be represented by models or drawings, such as culverts, bridges and stations, the track, rails, rail fastenings, spikes, bolts, nuts, washers, etc., the turn-tables, water tanks, pumping machinery and appliances for handling freight, the locomotives of various classes, models of passenger, sleeping, mail, baggage and express cars, freight cars of every description, refrigerator cars, snow plows, wrecking machinery, shop tools of all kinds, etc., etc. This list is of course not even an attempt at completeness. The object to be aimed at is to have all the branches of railroad manufactures represented, so that one branch will aid the others. Thus it would be much easier to sell car springs to foreign countries if the foreign buyer could see that he could buy car wheels here at the same time, and the sale of both is made easier if the axles can be manufactured and shipped with the springs and wheels. Car-builders can sell cars easier if an American locomotive builder furnishes the engines, and so on indefinitely. Every branch of manufactures will therefore be benefited by having every other branch represented.

A very great defect, which those who visit international exhibitions have observed at all of them, is that no clear and definite information concerning the exhibits is procurable during the early part and sometimes during the whole of the exhibitions. Objects are sent seemingly for the purpose of appearing as insoluble enigmas. The persons who are interested in knowing and learning about them find it impossible to learn what it would be to the advantage of the exhibitor that they should know, and he is then surprised that the exhibition has not benefited him. Now if a systematic exhibition, such as we have indicated, should be prepared, its usefulness would be doubled, if, before the exhibition opened, a complete description of the exhibit was printed and the objects illustrated by engravings, so that those who saw them could take away some concise and definite information about what they saw.

Now it is believed that all this could be accomplished in a very simple way, without much outlay of money, and at an expense to each one disposed to exhibit which would be merely nominal. It could be done if the manufacturers interested would simply call a meeting and have the whole subject set forth and discussed, then appoint a proper committee of say three to carry out those views, that committee to employ some suitable person to act for them and do the work, the expenses to be paid by contributions from those who propose becoming exhibitors. Besides the actuary, as he might be called, it would be necessary to pay some competent person to write the descriptions of the exhibits, and if the project met with favor it would be necessary to send a representative to Paris. A cost of a few hundred dollars, to each exhibitor, would probably be sufficient to pay all the expenses incurred by the plan suggested. No other means is available by which information could be so generally and so extensively diffused as in this way. If the objects were properly described and illustrated, every technical paper in Europe would be glad to make use of the material thus furnished. Much of it would be translated into half-a-dozen different languages and would be scattered over the whole world.

This is, it is true, an exclusively selfish view to take of the matter. There is another, and more unselfish one, which should not, and we trust will not, be without its influence on those for whom we are writing. We refer to the friendly relations which would be promoted by our participation in their exhibition between our nation and a people who have been good friends to us. The effect of such exhibitions is not alone that other nations learn about us, but that those who take part always learn much of the resources and productions of those with whom they are associated and with whom for a time at least they are identified. The consequence is that, not only do they take from us what we produce, but we take from them what they make, so that the relations which are established result almost in a continued intercourse between the nations who learn about each other in this way, and the flag of truce which commerce displays then helps to make peace and good will perpetual thereafter.

THE CENTRAL VERMONT CASE.

The full opinion of the Vermont Supreme Court in the Central Vermont case has not yet been published, but from the summaries which reach us from trustworthy sources it is apparent that it makes a very great change in the legal standing of the various parties. The case came before the Court on an appeal from an order of Judge Royce, sitting as chancellor, which denied the petition of the Central Vermont Company as Receiver for leave to sell the trust property to satisfy the trust debts. In his decision Judge Royce had intimated that the petition ought to be granted, but he denied it *pro forma*, for the purpose of bringing the question at once before the Supreme Court, to which it would have gone in any event. An appeal was at once taken and the case was very fully argued in July, and was under consideration until Oct. 30, when the decision was announced.

The Supreme Court carefully sets aside all outside considerations and bases its decision upon the strict law of the case alone. That the present system of management is cumbrous and expensive, that the sale and reorganization would put an end to long contention and vexatious litigation, even to a grave public scandal, cannot, it says, be considered by the Court in the face of the plain law of the case, and cannot be allowed to influence the Court to declare as law that which is not law, or to authorize the adoption of measures not known to nor warranted by the law. Thus setting aside all questions of expediency and governed by the law alone, the Court decides that the petition cannot be granted and that the trust property cannot be sold as proposed.

But the decision goes much further than the simple denial of the petition. The trustees under the so-called perpetual receivership constituted by the compromise decree of 1864, and their successor and present representative, the Central Vermont Company, have claimed that their acts had the support and sanction of decrees of court, and that they were acting as the officers of the Court of Chancery and under its direction. The Supreme Court holds that the true receivership ended in 1864. That receivership was established by the Court of Chancery under the Supreme Court mandate of 1861 and lasted until the so-called compromise decree of 1864. The management or trust then established was by common consent of all parties in the case; it was a trust in which the interests of all parties were pooled and owed its validity solely to the agreement of the parties, the compromise decree being simply a decree by common consent, a formal setting forth of the agreement, as it were, not involving judicial deliberation or judgment in its provisions. This being the case, the trustees under the compromise decree, and the Central Vermont Company as their successor, were not and are not receivers in the proper sense of the word. They are not officers of the Court, but simply managers of the trust property with the consent and by agreement of its owners.

This point being established at once works a very important change in the standing of the trust debts. The Court does not deny that expenses necessarily incurred for the maintenance and preservation of a property under a legal receivership may be a prior lien upon the property,

but it does not give such standing to the trust debt in this case. All the proceedings under the trust have derived their validity from the consent or acquiescence of the parties in interest, and the orders of the Chancery Court are held to have been simply a recognition of that consent, not judicial, but simply formal and ministerial in their nature. Further, it cannot be held that the parties are bound to anything different from the substance of the proceedings as they were understood and intended by all concerned. If the Vermont & Canada stockholders or the Vermont Central bondholders could have foreseen that the trust would result in such a sale as that proposed they would never have become parties to the agreement. The Court holds it plain that the Vermont & Canada Company and the mortgage bondholders are in a position entirely different from that of the creditors of the trust. While the expenses properly incurred in the management and operation of the trust are to be paid before the beneficiaries of the trust are entitled to partake of the earnings, those expenses are not a charge upon the *corpus* of the property in priority to other rights and interests in such a sense as to make the proposed sale either lawful or needful.

In brief, the Court intimates that the Vermont & Canada Company has the first claim upon the net earnings to satisfy its claim for rent. Subject to its claim the Vermont Central bondholders have their claim for interest under the provisions of the respective mortgages; subject to these again are the trust bonds, and lowest of all is the floating or unsecured trust debt. The fact that the last has no specific security does not give it any higher claim than the secured debt, and would not in any event. This statement of priority, apparently, is only incidental, and the Court says that the standing of the various parties can be properly determined when it is sought to enforce their rights. Finally, the decision not only denies the lien of the trust debt but says that, even if that lien was admitted, it would not warrant the order of sale asked for. Even if the trust debt were a prior lien, "it would be a redeemable lien, resting on the property in the character of an equitable mortgage, and a sale would be ordered in any event only on failure to redeem according to a final decree in that behalf."

This decision clears the air wonderfully, but at the same time it places the holders of the trust debt in a very bad position. Instead of absorbing the whole property, as they had expected, their lien is a subordinate one; they are reduced to the position of ordinary floating-debt creditors and their claims are worth little or nothing. The Vermont & Canada stock is $3,000,000, and the 8 per cent. rental thereon is by the lease in the nature of a mortgage on the whole property, having, as the Court intimates, the first claim. The Vermont Central first mortage is for $3,000,000 and the second mortgage for $1,500,000. The Central Vermont has made few reports and those incomplete, but the amount of the trust debt was stated last year, when the plan of reorganization was offered, at $3,795,500, and the floating debt at $2,878,000, and it was proposed to fund the whole in $5,500,000 new bonds. The only accessible report gives the earnings of the trust property for the two years ending June 30, 1876, at $5,244,636 gross and $1,693,570 net, but this includes the earnings of the Rutland and other leased lines, and how much of it came from those lines is not stated. It is very evident, however, that the Vermont Central road is not worth more than its $4,500,000 of bonded debt, and that the value of a subordinate lien must be very small. Thus the decision of the court will probably work some hardship to the holders of the trust debt, but, in view of the history and circumstances of the case it cannot be doubted that that decision is in accordance, not only with strict law, but also with substantial justice.

The Empire Line and the Petroleum Traffic.

The transfer of the Empire Line to the Pennsylvania Railroad Company and others removes from the field one of the most active and intelligent cultivators of traffic. The Empire Line had a very efficient staff and was directed with great skill and sagacity. Its closest connection was with the Pennsylvania Railroad Company, which caused its birth probably as well as its death, and doubtless since the completion of the Pennsylvania's system some part of its work was directly in competition with other agencies of the Pennsylvania Railroad. This is the case with nearly all fast freight lines. But the Empire Line more than most similar organizations devoted itself chiefly to special kinds of traffic which were secured to the Pennsylvania Railroad almost solely through it. Through its fleet of steamers plying between Erie and the upper lakes, it gave the Pennsylvania a share of the important "lake and rail" traffic, including a large amount of grain; and through its tank cars, and especially its great system of pipe lines in the oil regions, it obtained a very large petroleum business, delivering most that went to Philadelphia and a large part of that going to Baltimore and New York. It requires special appliances to secure a petroleum traffic. The producer does not take his freight to the station of the carrier, but the carrier has to go to the well of the producer. And an essential part of the pipe-line system is the storage of petroleum. The producer can never see his own particular oil after the pipe line takes it. That carries it to the storage tanks where cars are loaded, and the shipper has a certificate for so many gallons of oil delivered at such and such places on payment of certain charges. Thereafter he handles and speculates in and buys and sells these receipts, and never looks at oil. The pipe line can send the oil where it pleases as fast as it pleases, always standing ready to honor the receipt for oil wherever it may be presented, within the range of the places with which it has to do, when the charges are paid.

It is easy to see, therefore, that he who controls a pipe line may largely determine the transportation of oil beyond the pipe line, and, inversely, without pipe lines, or some contract with those who control them, a railroad is liable to lose its oil traffic almost wholly. The pipes can be easily made to discharge at any station in their vicinity, or at all. This month it may deliver solely to Atlantic & Great Western cars, next month to the New York Central & Hudson River, the following month to the Pennsylvania.

The Empire Line (whose cars in this service were called the "Green Line") had cultivated the petroleum business with great vigor and success. Its pipe lines measured more than 500 miles, and it had almost every other appliance to accommodate this peculiar traffic. Yet for some months recently it was almost wholly deprived of this traffic. The production continued and indeed was larger than was ever before known, but it was denied to the Empire Line and the Pennsylvania Railroad. Another power in the petroleum business, the Standard Oil Company, overshadowed the Empire Line even, and it had decided to cut the latter off from the petroleum business. It seems very nearly to have succeeded, and to have compelled, substantially, the dissolution of the Empire Company, not, however, by the injury to its business for a few months, but by making it for the interest of the Pennsylvania Railroad Company to exercise its right to buy out the Empire Line. The Standard Oil Company, it seems, was willing to restore to the Pennsylvania Railroad a share of the oil traffic, if it could strengthen its position in control of the petroleum trade by the possession of part of the Empire Line's appliances. We have said that the sale of the Empire Line's property was to the Pennsylvania Railroad Company "and others," and in the report of the Empire Line meeting at which this sale was approved we find the statements:

"By an agreement with the Standard Oil Company the Empire Transportation Company sold them their pipe line interest for the sum of $1,094,805.56.

"By another agreement the Empire Transportation Company sold to the Standard Oil Company their refining interests in New York and Philadelphia for the sum of $501,652.78.

"The Standard Oil Company also took $900,000 of Oil-Tank Car Trust at par, and paid therefor in cash. They also settled with outside refineries and paid for personal property to the extent of $900,000, making a total cash payment of $3,400,000."

It seems, then, that really the Empire Company sold more property to the Standard Oil Company than to the Pennsylvania Railroad Company, the latter's purchase consisting chiefly of cars, while the former's included nearly everything by which the petroleum traffic can be commanded.

It is this purchase of the pipe lines by the Standard Company probably that has led to the report that the trunk lines have agreed to pay the Standard Oil Company half a dollar (or other amount) per barrel on all oil shipped from the oil regions, whether consigned to the Standard Company or not. It is true that the railroads pay the pipe line charges on the oil which they receive out of the freight rate charged by them—which of course may be perfectly legitimate charges; and as the Standard Oil Company now owns nearly all the pipe lines, it does receive something from the railroad companies on nearly every barrel shipped, but it is a payment for a service rendered, and not properly a drawback or a rebate.

Thus, as we have said, the Standard Oil Company has greatly strengthened its position by the dissolution or sale of the Empire Line. The latter was the Standard Company's only rival of importance in the oil regions, threatening also to become a formidable rival in the refining business. Now all the appliances which enabled the Empire Transportation Company to rival the Standard Company go to strengthen the latter. As the sale was made in connection with an agreement of the trunk lines for the distribution of the petroleum traffic and the rates thereon, and at the instance of the Pennsylvania Railroad Company, the Standard Company has doubtless made some agreement as to shipments by the different routes. At least it must have given the Pennsylvania Railroad some guaranty of traffic in return for the surrender to it of the appliances by which traffic is commanded.

Electric Illumination.

Some elaborate experiments have recently been made in England with magneto-electric machines mounted at the South Foreland light houses. These experiments were made with machines constructed by different makers, and the object in making the tests was to determine the relative merits of the machines. In a report by Professor Tyndall published in the last number of *Engineering* he says: "The new machines mark a great advance, both in economy and power, as regards the application of the electric light to lighthouse purposes." He further says that "Siemen's and Gramme's inventions undoubtedly place at the disposal of the Elder Brethren electric lights, of surpassing energy; transcending in power and individuality all other lights now existing."

The smaller Siemen's machine, which was decided to be superior to any of the others, measures 2 ft. 2 in. long × 2 ft. 5 in. broad and 10 in. high, and weighs 420 lbs. With 850 revolutions per minute and a consumption of 3.3 horse power the condensed beam of light was equivalent to 6,864 standard candles, the diffused beam to 4,138 candles. The cost of these machines is $375. The larger Siemen's machine measured 3 ft. 9 in. × 2 ft. 5 in. × 1 ft. 2 in., and weighs 1,306 lbs., with 480 revolutions per minute and 9.8 horse power; the condensed beam was equivalent to 14,818 standard candles and the diffused beam to 8,932 candles. Its cost is $1,375.

The electric light has already been used in France for the illumination of railroad stations, and these experiments indicate that the recent development of the art, and the improvement of the machines has placed at our disposal a light which will soon be generally employed for illuminating purposes, especially where it is necessary for lights to penetrate to great distances, as at sea, or possibly for head lights for locomotives, etc.

The experiments of Professor Tyndall indicate that the art has now passed the experimental stage, and that electrical illumination is about to enter a period of general introduction for practical purposes.

German Railroads and the Results of their Operation.

The German Railroad Union has just published its statistics for 1875.

At the close of that year the mileage of roads in the Union was:

	Miles.
German railroads	17,027
Austrian-Hungarian railroads	10,443
Foreign railroads	2,208
Total	29,678

This was an increase of 7¼ per cent. over the mileage in operation at the close of 1874.

The Union includes nearly all the railroads in the German Empire, in Austria, Hungary and Roumania, and some in Belgium, Holland and elsewhere.

The average mileage in operation during the year was 28,985 miles.

Of the German railroads, nearly 46 per cent. were State railroads, and 10⅝ per cent. more were private railroads worked by States.

This mileage was worked by 103 different managements, having on the average 288 miles of road each. The miles of road under a single management tends to increase of late years, but not very rapidly.

In this calculation, a government which works several different roads is not counted a single "management." In such cases the government organizes an administration for each road or system of roads, and such an administration is counted as one "management."

Of the 29,678 miles of road in the Union, 23⅞ per cent. had a double track. The proportion did not increase, owing to the large number of new roads, very few of which have a double track. In Germany 33.7 per cent. of the mileage is double track, in Austria-Hungary only 10 per cent., and in the other countries 14¼ per cent.

The capital invested in these roads amounted to about $3,000,000,000, being at the average rate of $101,846 per mile of road, and not varying greatly in the different countries, but very largely on different roads—from $181,491 on the Empress Elizabeth road of Austria and $177,937 on the Berlin Connecting road, to $24,082 on the Nuremberg & Fuerth and $24,433 on the Cottbus & Grossenhain.

There is a constant increase in the average capital expenditure per mile of road, as everywhere else in the world. This increase was at the rate of 2.2 per cent. in 1875, 3.85 per cent. in 1874, 3.31 in 1873, and 3.25 in 1872.

At the close of the year 1875 the stock of locomotives on the 29,678 miles of railroad in the Union was:

Four-wheeled	238
Six-wheeled	11,692
Eight-wheeled	729
Tank locomotives	1,402
Total	14,001

which is at the rate of 0.47 locomotive per mile of road, or one locomotive to 2.12 miles. The number of tenders was 12,533, of which 2,381 were four-wheeled and the rest six-wheeled.

The mileage made by these locomotives in 1875 was 240,254,450—an average yearly run of 17,161 miles per locomotive, which is about one-fifth less than the average here. The revenue train mileage, however, was but about two-thirds of the locomotive mileage.

The consumption of fuel per revenue train mile was at the rate of 35 lbs. of coke, 52 lbs. of coal, and 108 lbs. of lignite (brown coal). About one-tenth of the total mileage was made with lignite, and about three-fourths with coal.

The report also gives the consumption of coal per *axle-mile* on different roads, varying, for coal, from 1.05 lbs. to 4.17 lbs. There are usually two axles to a car, but sometimes three, and under some passenger cars four, as with us. A four-wheeled freight car there, however, carries as much as an eight-wheeled freight car here.

The average *cost* of fuel per revenue train mile was 6.1 cents, and per axle mile 0.15 cent, being about one-sixth less than in 1874. The cost per axle mile varied from 0.0656 cent to 0.520 cent, the highest cost being thus eight times as great as the lowest.

The stock of passenger cars at the close of 1875 was 26,397 in number, of which 20,151 were four-wheeled, 5,564 six-wheeled and 682 eight-wheeled. The number of the latter decreased

during the year, as it has for years past, and the chief increase was in four-wheeled cars, which are now used in Germany even when there are end platforms and entrances according to the American plan.

The passenger cars had seats for 1,114,590 passengers—an average of 42.2 per car. Of the seating accommodation less than 6 per cent. was for first-class passengers, 21⅛ per cent. was for second-class, 57 per cent. for third-class, and 15⅛ for fourth-class passengers.

There are seats for 37¾ passengers per mile of road.

The average distance run by passenger cars within the year 1875 was 20,520 miles, and the highest average on any road was 35,225 miles.

On an average, 23.17 per cent. of the seats of the cars were occupied while running; this proportion has gone on decreasing for six years, and is doubtless one of the chief causes why passenger traffic has become unprofitable in Germany. The road making the best showing in this respect had in 1875 37 per cent. of its seats occupied.

The number of freight cars at the close of the year was 287,006, or 9.663 per mile. Of these only 2,127 were eight-wheeled, and 5,875 six-wheeled, the remainder, more than 97 per cent. of the total, being four-wheeled. The greatest number of freight cars per mile on any road was 42.

The capacity of entire stock of freight, baggage, mail and construction cars (more than 95 per cent. being freight cars) was at the average rate of 20,900 lbs. per car, about the same as in this country.

The average distance run by freight cars in the year was 8,532 miles—the shortest for three years. Their average load was 41½ per cent. of their capacity, or about 9,337 lbs., and at the the average rate of 4,340 lbs. per axle. The cars which ran fullest had 69 per cent. of their capacity utilized, and these, by the way, were the cars of the Roumanian railroads.

The passenger traffic of the roads in the German Railroad Union increases, but not in proportion to the increase in mileage of roads. In 1875 there was an average passenger traffic of 115,638 passenger miles per mile of road, or 158⅛ passengers each way daily. This was less by 4.85 per cent. than in 1874, and by 6.81 per cent. than in 1873. The heaviest traffic was at the rate of 743,500 per mile, or 1,018⅛ each way daily.

The passengers were distributed among the different classes as follows: First-class, 1.6 per cent.; second, 15.0; third, 60.9; fourth, 18.1, soldiers and others carried at reduced rates, 4.4.

The average journey was just about 20 miles, and the average receipt per passenger per mile (for all classes) 1.526 cents. The highest average receipt on any road was 2.504 cents (in Roumania) and the lowest 1.26 cents.

The tonnage of freight was divided as follows between through and local shipments, the figures being the percentages:

	1875.	1874.	1873.	1872.	1871.
Local.....	39.17	39.86	41.35	43.50	43.93
Through.....	60.83	60.14	58.65	56.50	56.07

This shows the through traffic to have constantly grown faster than the local.

The amount of the freight traffic is shown by the number of tons carried one mile over the whole system of roads, as follows:

	1875.	1874.	Increase.	P. c.
Ton miles.....	10,046,380,016	9,726,550,300	319,829,716	3.29

The traffic has increased without interruption, from 1871 to 1872 by 11.34 per cent., from 1872 to 1873 by 18.51, and from 1873 to 1874 by 2.57 per cent. As, however, the railroad mileage has increased greatly in this period, the average traffic per mile of road has not shown anything like this growth. This average number of tons carried one mile *per mile of road* has been:

1875.	1874.	Decrease.	P. c.
220,780	228,973	8,193	3.58

And the traffic per mile in 1874 was 3.02 per cent. less than in 1873, that of 1873 being 5.62 more than that of 1872, which latter was less by 3.72 per cent. than that of 1871, the actual tonnage per mile of road for the several years beginning with 1871 having been 232,170, 223,541, 236,095, 228,973 and 220,780.

The movement in 1875 was equivalent to an average of 302.4 tons carried each way daily—enough to make one fully loaded freight train over a road with moderate grades.

Of course there were great differences on different roads, the heaviest freight carriers showing an average daily business of 1,680, 1,120, 906, 745, 730 and 667 tons each way; and 29 roads are enumerated whose average daily business varies from 6.6 to not more than 50 tons each way.

The average distance freight was carried on all the roads of the Union was 56 miles. On one road it was 155 miles, and on no other more than 115 miles.

The earnings of the roads in the Union were:

Passenger Trains:	Total.	Per mile.
Passengers	$83,969,808	$2,900
Baggage	3,228,460	112
Dogs	63,795	2
Total passenger	$87,262,063	$3,014
Freight Trains:		
Mails	$691,272	$24
Fast freight, local	2,987,385	103
" " through	3,699,593	128
Ordinary freight, local	72,597,728	2,509
" " through	121,417,752	4,197
Construction and service freight	1,575,290	54
Vehicles	736,442	25
Cattle	7,963,194	273
Miscellaneous	4,043,441	140
Total freight	$215,712,067	$7,453
Total earnings	$302,974,160	$10,467

The passenger earnings were 3.35 per cent. more than in 1874, but 3.23 per cent. less per mile of road, and 11.4 per cent. less per mile of road than in 1873. Passenger earnings were more than $5,000 per mile of road on fifteen roads, the largest passenger earnings per mile being $15,400, $11,073, $10,640, $9,072 and $7,143. On 34 railroads the passenger earnings were less than $1,200 per mile and on five less than $500, the smallest being $231.

Local passengers gave 75.63 per cent. of the passenger earnings. The proportion for five years has varied from 68.18 to 76.08.

The freight earnings were 5.58 per cent. more than in 1874, but the freight earnings per mile of road were 1.42 per cent. less, and 3.76 per cent. less than in 1873.

There were 25 roads on which the freight earnings were more than $10,000 per mile in 1875, those ranking highest having $26,791, $25,106, $18,632, $18,102, $17,420, $17,388, and $15,678 per mile respectively.

The freight earnings were less than $2,000 per mile on 29 roads, less than $1,000 on six, and the lowest were $548, $712, and $740 per mile.

The roads of the Union had other earnings, chiefly for rents, use of cars, etc., which amounted to very nearly $15,000,000 in 1875, and the total earnings and earnings per mile have been:

	1875.	1874.	Inc or Dec.	P. c.
Total.....	$317,951,822	$303,741,192	Inc..$14,210,630	4.68
Per mile...	10,925	11,173	Dec.. 248	2.22

The total earnings per mile in 1875 were 6.0 per cent. less than in 1873, 3.62 less than in 1872, and 8.75 less than in 1871.

The total earnings are reported for 1875 at more than $10,000 per mile on 49 railroads, more than $15,000 on 23, more than $20,000 on 11, and more than $25,000 on three, whose earnings per mile were $25,065, $31,082 and $33,039 respectively.

On 49 roads also the gross earnings were less than $5,000 per mile, on 20 less thon $3,000, on eight less than $2,000, and the smallest earnings per mile were $1,222, $1.306, $1,315 and $1.492.

The earnings per service train mile were $1.87 in 1875, against $1.84 in 1874. On one road the earnings per train mile were $4.23 and on five others more than $3; on one it was 56¼ cents, and on ten less than a dollar.

The percentages of total earnings from passengers, freight and other sources for five years were:

	1875.	1874.	1873.	1872.	1871.
Passengers	27.45	27.80	28.86	28.52	27.90
Freight	67.87	67.27	66.20	65.79	66.56
Other	4.68	4.93	4.94	5.69	5.54
Total	100.00	100.00	100.00	100.00	100.00

The proportion of freight earnings has thus increased constantly. It is now about as large as on American roads.

The working expenses of the roads are reported as follows;

Road Department:	Total.	Per mile.
Wages	$19,913,002	$633
Maintenance	28,947,906	1,000
Other expenses	6,326,400	219
Total road	$55,187,308	$1,907
Transportation Dept.:		
Wages	$41,467,990	$1,433
Motive power	32,118,882	1,110
Repairs of rolling stock	21,720,836	751
Additions to equipment	1,062,950	36
Other expenses	15,190,754	525
Undistributed (two small roads)	137,039	5
Total transportation	$111,698,451	$3,860
General management	10,873,630	376
Rents renewal funds, etc	3,080,632	107
TOTAL WORKING EXPENSES	$180,840,021	$6,250

The total expenses per mile of road were 7.9 per cent. less than in 1874. For years before there had been a continual increase from year to year. In 1875 there was a decrease of 5.7 per cent. in the road department expenses per mile, in the transportation department (which includes rolling stock) 9.4 per cent., and in the general management 4.2 per cent. The expenses of the transportation department were 66 cents per revenue train mile and 1.62 cents per *axle* mile.

The total average working expenses were $1.06½ per train mile in 1875, against $1.11 in 1874, and they varied from 49 cents to $3.04 on different roads in the Union.

The proportion of expenses to receipts for a series of years has been:

Year.	Per cent.	Year.	Per cent.
1868	44.23	1872	54.67
1869	44.32	1873	57.87
1870	45.55	1874	60.38
1871	47.10	1875	56.88

Thus in 1875 for the first time the increase in the percentage of expenses was arrested. This proportion varied on different roads from 33.7 to 150.5, and on 14 roads the working expenses were more than the total earnings.

The net earnings of the roads in the Union amounted to $138,208,728 in 1875, which is 13¼ per cent. more than in 1874. There had been a loss of 3.9 per cent. from 1873 to 1874, a gain of 6.7 from 1872 to 1873, and a loss of 5¾ per cent. from 1871 to 1872—the mileage meanwhile having increased yearly. From 1874 to 1875 there was an increase in net earnings on 82 railroads, and a decrease on 33.

In net earnings per mile, the change from 1874 to 1875 was also favorable, showing an increase from $4,417 to $4,674 per mile, or 5.8 per cent. For three years before there had been a decrease, amounting from 1871 to 1874 to about 28 per cent.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Freehold & New York.—Extended from Matawan, N. J., north to Keyport, 1 mile, completing the road.

Emlenton & Clarion.—Extended northeast 11⅛ miles to Shippenville, Pa. It is of 3 ft. gauge.

Pittsburgh & Castle Shannon.—Extended from Castle Shannon, Pa., south by west to Munntown, 15 miles. It is of 3 ft., 4 in. gauge.

Waynesburg & Washington—Extended from Baneville, Pa., south to Waynesburg, 11 miles, completing the road, which is of 3 ft. gauge.

Scioto Valley.—Completed by laying track from Chillicothe, O., southward to Waverley, 18 miles.

Dayton & Southeastern.—Extended from Frankfort, O., east by south to Mussellman's, 2½ miles. It is of 3 ft. gauge.

Waukon & Mississippi.—Track laid from Waukon, Ia., southeast to Adams, 23 miles. It is of 3 ft. gauge.

Corpus Christi, San Diego & Rio Grande.—Extended from the Oso River westward to Banquette, Texas, 14 miles. It is of 3 ft. gauge.

Colorado Central.—The standard-gauge line is extended from Fort Collins, Col., southward to Longmont, 35 miles, completing the line from Denver to the Union Pacific at Hazard.

Central Pacific—On the loop line from Oakland to Bantas track has been extended northwest 25 miles to Antioch, Cal.

This is a total of 156 miles of new railroad, making 1,824 miles completed in the United States in 1877, against 1,913 miles reported for the corresponding period in 1876, 1,080 in 1875, 1,524 in 1874, 3,130 in 1873, and 6,106 in 1872.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

American Society of Civil Engineers.—The following officers were chosen at the annual meeting Nov. 7: For President, E. S. Chesbrough, Chicago; for Vice-Presidents, Albert Fink, Louisville, Ky.; W. Milnor Roberts, New York; for Secretary, John Bogart, New York; for Treasurer, J. James R. Croes, New York; for Librarian, John Bogart; for Directors, George S. Greene, New York; C. Shaler Smith, St. Charles, Mo.; Joseph P. Davis, Boston; William H. Paine, New York; C. Vanderwort Smith, New York.

Atchison & Nebraska.—Mr. H. P. Jacques has been appointed Car Accountant, with office at Atchison, Kansas.

Brunswick & Chillicothe and St. Louis, Council Bluffs & Omaha.—The officers of these two roads, which are operated as one, are:—Henry Hatch and George Van Every, Lessees; George M. Rice, President; Edward P. Burnham, Secretary and Treasurer. The offices are at Chillicothe, Missouri.

Camden & Atlantic.—At the annual meeting in Camden, N. J., Oct. 25, the following directors were chosen: Enoch A. Doughty, Absecom, N. J.; John Lucas, Gibbsboro, N. J.; Andrew K. Hay, Winslow. N. J.; Samuel C. Cooper, James B. Dayton, Thomas H. Dudley, John F. Starr, Camden, N. J.; George T. Da Costa, Charles D. Freeman, W. C. Houston, J. R. Jones, John A. Merritt, George W. Steever, Philadelphia. The only new director is Mr. Steever, who replaces W. C. Allison. The board elected Charles D. Freeman, President; D. M. Zimmerman, Secretary and Treasurer. Mr. Freeman replaces Mr. John Lucas, resigned, as was noted last week.

Columbus & Gallipolis.—The officers of this company are: President, Gen. C. C. Wallcutt; Vice-President, S. W. Kilvert, Jr.; Secretary, J. C. Donaldson; Treasurer, C. P. L. Butler; General Manager, C. H. White.

Colorado Central.—Mr. Thomas L. Kimball has been appointed General Passenger Agent and Mr. E. P. Vining General Freight Agent, both appointments dating from Nov. 1. These gentlemen hold the same positions on the Union Pacific, and will act for the Colorado Central also.

Dakota Southern.—At the annual meeting in Yankton, Dakota, Oct. 31, the following directors were chosen: W. W. Brookings, Dr. W. A. Burleigh, M. P. Ohlman, J. M. Stone, Yankton, Dak. Ter.; C. G. Wicker, Joel H. Wicker, Chicago; A. H. Morrison, St. Joseph, Mich. The board elected C. G. Wicker President; A. H. Morrison, Vice-President and General Manager; Dr. W. A. Burleigh, Secretary; Joel H. Wicker, Treasurer; W. W. Brookings, Solicitor; George E. Merchant, Superintendent.

Del Norte & Alamosa.—The officers of this new Colorado company are: President, W. H. Van Gieson; Vice-President, Thomas P. Medley; Secretary, Henry Foot; Treasurer, John L. McNeil.

Grand Rapids, Newaygo & Lake Shore—Mr. A. W. Hooper, Superintendent, is also General Freight and Ticket Agent; office at Grand Rapids, Mich.

Gulf, Colorado & Santa Fe.—Most of the directors chosen at the recent annual meeting having declined to serve, on account of some doubts as to the legality of the meeting, a compromise has been arranged, by which Galveston County is to appoint nine directors, and the private stockholders are to choose the other four. The Galveston County Court has therefore named as directors Messrs. F. C. Hume, J. H. Hurt, W. J. Jones, C. G. Wells, Jno. D. Rogers, H. Seeligson, H. Kempner, A. H. Belo and C. B. Lee. The stockholder directors are J. E. Brown, Leon Blum, M. Kopperl and J. E. Wallis. The county directors met and elected C. G. Wells, President; A. H. Belo, Vice-President; H. Seeligson, Treasurer; D. McCaleb, Secretary. It is probable that the question of the legal composition of the board may be taken into the courts.

Hannibal & St. Joseph.—At the annual meeting in Hannibal, Mo., Nov. 5, the following directors were chosen: Wm. Dowd, W. B. Bliss, W. B. Leonard, M. P. Bush, J. M. Hartshorne, A. W. Greenleaf, Gen. Horace Porter, H. H. Cook, Julius H. Gaston. These are all new directors except Messrs. Dowd, Greenleaf and Porter, and those gentlemen have been in the board only a short time.

Hannibal & St. Joseph.—Mr. C. S. Groff has been appointed General Agent at St. Joseph, Mo. He has been for five years past General Agent for the Wabash at Quincy, Ill.

Illinois & St. Louis Bridge.—Mr. Edward Vernon has been appointed General Freight Agent for this company and the Wiggins Ferry Company, whose interests are now pooled. Mr. Vernon is very thoroughly familiar with St. Louis traffic.

Louisville, Cincinnati & Lexington.—The new company having taken possession of the road, President Wilder announces the following appointments: General Superintendent, John McLeod; Secretary and Treasurer, S. S. Eastwood; Auditor, Wm. Mahl; General Passenger and Ticket Agent, S. S. Parker; General Freight Agent, Edgar Hill. Mr. McLeod was recently Receiver; the other officers are continued in their respective positions.

Martha's Vineyard.—At the annual meeting in New Bedford, Mass., Oct. 31, the following directors were chosen: Joseph P. Baker, E. P. Carpenter, G. N. Collins, Joel H. Hills, Henry Ripley. The board elected E. P. Carpenter President; Joseph T. Pease, Treasurer; J. H. Hills, Clerk.

Massachusetts Central.—At the annual meeting in Boston, Oct. 31, the following directors were chosen: James M. Stone, John Wooldredge, Charles A. Cutting, Boston; Francis Brigham, Hudson, Mass.; J. E. Smith, E. B. Shattuck, Worcester, Mass.; Hiram Wadsworth, Barre, Mass.; Lewis J. Dudley, Northampton, Mass.; Henry F. Hills, Amherst, Mass.; James S. Draper, Wayland Mass.; Franklin Bonney, Hadley, Mass.; Charles M. Harris, West Boylston, Mass.; Andrew H. Green, Josiah H. Reed, D. R. Mangam, Joseph Pool, Daniel J. Sprague, New York. The New Yorkers are all new directors. It is understood that Mr. Andrew H. Green is to be President.

Michigan Air Line.—Mr. M. S. Hadley has been appointed General Manager, and P. S. Casey, Treasurer. Offices at Romeo, Mich.

Paducah & Elizabethtown.—At the annual meeting in Elizabethtown, Ky., recently, the following directors were chosen: W. B. Bonn, B. DuPont, J. Hallgarten, R. H. G. Minty, Arnold Marcus, Extine Norton, W. F. Norton, H. C. Pindell, H. W. Smithers. The board re-elected Henry W. Smithers President; H. C. Pindell, Vice-President and Counsel; R. W. Brown, Secretary; August Rutten, Treasurer; R. H. G. Minty, General Manager.

Pennsylvania.—Hon. John Scott has been appointed General Solicitor, in place of W. J. Howard, resigned. Mr. Scott is a

director of the company, and has been General Counsel. He was formerly United States Senator from Pennsylvania.

Philadelphia, Germantown & Norristown.—At the annual meeting in Philadelphia, Nov. 5, the following managers were chosen: Wm. Musser, Wm. H. Slingluff, I. V. Williamson, John F. Gilpin, John A. Brown, Jr. The road is leased to the Philadelphia & Reading.

Rio Grande.—The officers of this road now are: M. J. Gomila, Receiver; F. San Roman, President; Wm. A. Valls, Secretary; E. Armendaiz, Treasurer. The offices are at Brownsville, Texas.

Southern, of Long Island.—The New York Supreme Court has appointed Col. Thomas W. Sharp and Frederick D. Tappen Receivers.

Southeastern, of Canada.—Mr. Asa B. Foster, Jr., has been appointed Manager, in place of his father, whose death is noted elsewhere.

Stillwater & St. Paul.—Mr. E. Q. Sewall has been chosen Treasurer, in place of Thomas N. Davis, deceased. The road is leased to the St. Paul & Duluth.

St. Louis, Keokuk & Northwestern.—Mr. H. B. Blood, Secretary and Treasurer, has been appointed also General Freight Agent. His office is in Keokuk, Iowa.

Union Railway, Transfer & Stock Yards.—Mr. Albert Scott has been appointed Superintendent of this company's road, better known as the Indianapolis Belt. He has been for some time Trainmaster on the Jeffersonville, Madison & Indianapolis road.

Wyandotte, Kansas City & Northwestern.—Mr. N. B. Lord is appointed Superintendent, in place of Col. G. W. Vaughn, resigned.

PERSONAL.

—Hon. Asa B. Foster, the well-known Canadian contractor, died suddenly of heart disease in Montreal, Nov. 1. Mr. Foster was born in Dummerston, Vt., in 1817, but his parents removed to Canada four years later, and he was brought up there. He served for a number of years under his uncle, also a railroad contractor, chiefly in New England, and then entered business for himself. He built the Quebec Branch of the Grand Trunk, the Stanstead, Shefford & Chambly, part of the Canada Central and the Southeastern of Canada. His connection with the last-named road had involved him in financial difficulties, which he was engaged in settling at the time of his death. He also held contracts for a further extension of the Canada Central and a branch of the Canadian Pacific. Mr. Foster had been a member of the Assembly of Lower Canada and of the Dominion Senate.

—Mr. James Brown, head of the great New York banking firm of Brown Brothers & Co., died in New York, Nov. 1. He was in his 87th year and had been in failing health for some time. Mr. Brown was President of the New York & Erie Railroad Company for a year, many years ago; he was one of the chief supporters of the Collins Steamship Line between New York and Liverpool, and for a long time was largely interested in the Pacific Mail Steamship Company. Mr. Brown had taken no active part in business for a number of years.

—Mr. Minott A. Osborn, a member of the Connecticut Railroad Commission, died last week at his residence in New Haven, Conn. Mr. Osborn was originally a printer, and was chiefly known as an active politician and editor of the New Haven *Register*.

—Mr. Charles K. Lord, General Passenger and Ticket Agent of the St. Louis, Kansas City & Northern road, was recently presented by his friends and associates in business with a very handsome cylinder desk and office chair with all the latest improvements.

—Mr. W. G. Brown retired from the position of General Freight and Passenger Agent of the Colorado Central Railroad on Nov. 1.

—Mr. John Welsh, of Philadelphia, lately appointed Minister to England, and best known as a prominent merchant of Philadelphia and President of the Centennial Board of Finance, was President of the North Pennsylvania Railroad Company for a time, soon after its first organization.

—On the return of Mr. Job H. Jackson, of the Jackson & Sharp Manufacturing Co., to Wilmington, after his arrest by the Georgia authorities, a meeting of his fellow-townsmen was held, at which there was passed unanimously a resolution which says: "After hearing a statement of the case, and examining the correspondence and papers submitted relating thereto, it is the sense of this meeting that no fraud was intended or committed by Mr. Job H. Jackson in the premises; and that our confidence in his integrity remains unshaken."

TRAFFIC AND EARNINGS.

Water Rates.

Lake rates have remained low, but advanced from the extreme depression noted last week, when 3½ cents a bushel for wheat and 3 cents for corn were the quotations. Most of last week the rates were half a cent. higher, and Monday last 4½ cents for wheat and 4 for corn were the quotations. Insurance on the lakes is advanced on the first of November.

Canal rates have been very nearly stationary, quoted at 9¾ cents a bushel for wheat and 8⅛ for corn from Buffalo to New York.

Ocean rates showed little change until Monday. Saturday's quotations for grain by steam from New York to Liverpool were 9⅛d. per bushel; but Monday large contracts were made at 8d. to 8¼d. Other quotations Monday were: New York to Liverpool by steam, cotton ⅝d. to 11/16d. per pound; provisions, 35s. to 45s. per ton; leather, 70s. per ton; pork and beef, 4s. 6d. per barrel; tobacco, 37s. 6d. per hogshead. Contracts for grain by sail to Cork for orders were taken at 7s. per quarter. From New Orleans to British ports several contracts have been made for vessels for cotton at 13/16 to 1 cent per pound—about 50 per cent. more than the New York rate by steam.

Grain Movement.

Buffalo grain receipts for the year, up to Oct. 31, were as follows:

	1877. Flour.	1877. Grain.	1876. Flour.	1876. Grain.
By lake	512,734	51,949,792	637,820	38,628,153
By rail	862,400	12,708,940	966,500	11,709,200
Totals	1,375,134	64,658,732	1,604,320	50,337,353

This is a decrease of 329,186 barrels, or 14.3 per cent., in flour, and an increase of 14,321,379 bushels, or 28.5 per cent., in wheat. The rail receipts were, this year, 62.7 per cent. of the flour, and 19.7 per cent. of the wheat. The shipments eastward of grain received by lake were:

	1877.	1876.	Inc. or Dec.	P. c.
By canal, bushels	42,361,696	24,478,489	Inc .. 17,883,207	73.1
By rail	9,028,802	11,164,927	Dec.. 2,136,125	19.1
Totals	51,390,498	35,643,416	Inc .. 15,747,082	44.2

The rail shipments were 17.6 per cent. of the total this year, and 31.3 per cent. in 1876. The canal opened May 8 in 1877, and May 4 in 1876. The Buffalo *Commercial Advertiser*, from which the above figures are taken, says: "The movement of cereals for the month of October has been immense—almost without a parallel in the history of the port. The receipts of all kinds of grain aggregate 14,328,917 bushels. Of this amount 8,326,506 bushels were wheat and 4,127,351 were corn. The total imports from the opening of navigation to Oct. 31 were 51,949,729 bushels, to 38,628,153 last year, and 43,929,857 in 1875. The movement thus far is in excess of the entire receipts in many previous years.

"The showing by canal is also very gratifying. The offerings for October have been greater than the capacity of the boats now available for the business, and hence a large quantity has gone forward by rail. The total shipments by canal for the season, as reported by the Canal Collector, are 42,361,696 bushels, to 24,478,489 last season and 30,193,874 in 1875. The total collections reach $407,192 this year, to $513,997 in 1876.

"Receivers, forwarders and carriers have had all the business lately they cared for, and the prospect is that there will be no scarcity for the next month. The season of 1877 promises to be among the best this port has had since the war."

Baltimore grain receipts for October were as follows, flour being reduced to wheat in the totals:

	1877.	1876.	Inc. or Dec.	P. c.
Flour, barrels	141,328	140,647	Inc .. 681	0.5
Wheat, bushels	1,618 996	544,635	Inc .. 1,074,361	197.3
Corn	1,030.243	1.274,955	Dec.. 244,712	19.2
Other grain	144,703	112,430	Inc .. 32,273	28.7
Total, bushels	3,500,582	2,635,255	Inc .. 865,327	32.8

For the ten months ending Oct. 31 the receipts were:

	1877.	1876.	Decrease.	P. c.
Flour, barrels	935,416	1,083,245	147,832	13.6
Grain, bushels	24,001,734	24,992,592	990,858	4.0
Total, bushels	28,678,814	30,408,832	1,730,018	5.7

The October receipts exceed those for September of this year by 20,065 barrels of flour and 595,363 bushels of grain.

For the week ending Oct. 27 receipts and shipments of grain of all kinds were, in bushels:

	1877.	1876.	Inc. or Dec.	P. c.
Lake ports' receipts	3,708,064	4,495,985	Dec.. 787,921	18.0
" " shipments	3,215,675	3,910,976	Dec.. 695,301	17.8
Atlantic ports' receipts	6,374,999	4,010,233	Inc .. 2,364,766	59.0

Of the lake ports' shipments, 20¼ per cent. were by rail this year, against 34¾ in 1876, 47 in 1875, and 9½ in 1874.

The receipts at the seaboard were distributed in the following proportions among the different ports: New York, 61.9 per cent.; Baltimore, 11.1; Philadelphia, 9.2; Montreal, 7.8; Boston, 5.9; New Orleans, 4.0; Portland, 0.1 per cent.

Railroad Earnings.

Earnings for various periods are reported as follows:

Year ending Sept. 30:

	1876—77.	1875-76.	Inc. or Dec.	P. c.
Worcester & Nashua	$528,883	$545,966	Dec.. $17,083	3.1
Expenses	339,979	344,728	Dec.. 4,749	1.4
Net earnings	$188,904	$201,238	Dec.. $12,334	6.1
Earnings per mile	5,616	7,807	Dec.. 2,191	28.1
Per cent. of exps	64 28	63.14	Inc .. 1.14	1.8

Ten months ending Oct. 31:

	1877.	1876.		
Atchison, Topeka & Santa Fe	$2,094,669	$2,043,473	Inc .. $51,196	2.5
Chicago & Alton	3,750,501	4,218,277	Dec.. 467,776	11.1
Chicago, Milwaukee & St. Paul	6,555,450	6,678,652	Dec.. 123,192	1.8
Hannibal & St. Joseph	1,804,274	1,673,745	Inc .. 130,529	7.8
Missouri, Kansas & Texas	2,644,115	2,595,927	Inc .. 48,188	1.9
St. Louis, Kansas City & Northern	2,576,850	2,592,078	Dec.. 15,228	0.6
Bur., Cedar Rapids & Northern	981,342	942,675	Inc .. 38,667	4.1
Central Pacific	13,732,107	15,024,262	Dec.. 1,292,155	8.6
St. Louis, Iron Mt. & Southern	3,497,526	3,043,949	Inc .. 453,577	14.9
Wabash	3,726,5	3,645,038	Inc .. 81,498	2.2

Nine months ending Sept. 30:

Kansas Pacific	$2,276,893	$2,154,821	Inc .. $122,072	5.7
Net earnings	911,976	863,424	Inc .. 48,552	5.6
Per cent. of exps	60.00	59.93	Inc .. 0.07	0.1
Louisville, Cin. & Lexington	814.615	.....	.....	....

Month of September:

Louisville, Cin. & Lexington	$110,245	.....	.....	....
Net earnings	45,·81	.....	.....	....
Per cent. of exps	58.51	.....	.....	....
St. Paul & Sioux City	61,720	$49,055	Inc .. $12,665	25.6
Sioux City & St. Paul	42,228	32,404	Inc .. 9,824	30.3

Month of October:

Atchison, Topeka & Santa Fe	$340,242	$285,088	Inc .. $55,154	19 3
Chicago & Alton	447,781	532,867	Dec.. 85,086	15.9
Chicago, Milwaukee & St. Paul	1,183,000	817,259	Inc .. 365,741	44.7
Hannibal & St. Joseph	312,000	272,000	Inc .. 40,000	14.7
Missouri, Kansas & Texas	329,531	335,275	Dec.. 5,744	1.7
St. Louis, Kan. City & Northern	347,940	328,558	Inc .. 19,382	5.9
Bur., Cedar Rapids & Northern	171,533	111,441	Inc .. 60,092	53.9
Central Pacific	1,696,0 0	1,888,066	Dec.. 192,066	10.2
Michigan Central	669,685	647,922	Inc .. 21,763	3.4
St. Louis, Iron Mt. & Southern	512,200	437,902	Inc .. 74,298	17.0
Wabash	516,115	439,710	Inc .. 76,405	17.4

Third week in October:

Denver & Rio Grande	$17,002	.....	.....	...

Week ending Oct. 26:

Great Western, of Canada	$99,794	$87,858	Inc .. $11,936	13.6

Week ending Oct. 27:

Grand Trunk	$217,864	$184,502	Inc .. $33,362	18.1

Erie Canal.

Clearances from Buffalo on the Erie Canal for October and for the season up to Oct. 31 were as follows:

October:	1877.	1876.	Inc. or Dec.	P. c.
Boats cleared	1,400	748	Inc .. 652	87.2
Tolls collected	$98,165 06	$98,216 54	Dec.. $51 48	0.1
Season:				
Boats cleared	5,970	4,202	Inc .. 1,768	42.1
Tolls collected	$407,192 15	$513,997 28	Dec.. $106,805 13	20.8

The canal opened May 8 in 1877, and May 4 in 1876.

Norfolk Cotton Business.

Norfolk cotton receipts for October were 65,827 bales, a decrease of 54,350 bales, or 45 2 per cent., from 1876. For the two months of the cotton year ending Oct. 31 the receipts were, in bales:

	1877.	1876.	Decrease.	P. c.
Atlantic, Mississippi & Ohio R. R.	18,520	40,031	21,511	53.8
Seaboard & Roanoke R. R.	46 846	93,838	46,992	50.1
Canal and otherwise	5,672	10,529	4,857	46.3
Totals	71,039	144,398	73,360	50.8

Of the receipts this year 32,597 bales were local and 38,441 bales through to points beyond. The cotton crop is unusually late this year.

West-Bound Freight Apportionment.

At the railroad managers' meeting in Chicago, Nov. 1, an adjournment was had without completing the work in hand. An agreement was reached as to St. Louis freights, however, it being decided that 12 per cent. of the west-bound freight to that city should go by way of Chicago, and that the St. Louis roads should have the remaining 88 per cent. The latter is divided equally between the Wabash, the Indianapolis & St. Louis, the Vandalia Line, and the Ohio & Mississippi.

Coal Movement.

Coal tonnages are reported as follows for the ten months ending Oct. 27, the tonnage in each case being that originating upon the line to which it is credited:

Anthracite:	1877.	1876.	Inc. or Dec.	P. c.
Philadelphia & Reading	5,578,577	3,845,624	Inc .. 1,732,958	45.1
Northern Central, Shamokin Div. and Sum'it Branch R.R.	590,921	777,803	Dec.. 186,882	24.0
Central of N. J., Lehigh Div.	2,325,217	2,189,958	Inc .. 55,261	1.6
Danville, Hazleton & Wilkesbarre	24,225	35,992	Dec.. 11,760	32.7
Pennsylvania Canal	279,961	347,464	Dec.. 67,503	19.4
Lehigh Valley	3,453,757	2,968,432	Inc .. 485,325	16.2
Pennsylvania & N. Y.	34,436	18,695	Inc .. 15,741	84.2
Delaware, Lack'wan'a & Western	1,434,897	1,449,364	Dec.. 14,467	1 0
Delaware & Hudson Canal Co	1,352,106	1,525,302	Dec.. 173,196	11.4
Pennsylva'ia Coal Co.	809,370	853,496	Dec.. 44,126	2.0
State Line & Sullivan	16,004	28,462	Dec.. 12,454	43.7
Total anthracite	15,799,475	14,040,590	Inc .. 1,758,885	12.5
Semi-bituminous:				
Cumberland, all lines	1,277,566	1,493,242	Dec.. 215,676	14.4
Huntingdon & Broad Top	112,483	128,388	Dec.. 15,905	12.5
Tyrone & Clearfield	1,127,873	979,219	Inc .. 148,654	15.2
Total semi-bitumin's	2,517,922	2,600,849	Dec.. 82,927	3.2
Bituminous:				
Barclay	268,236	281,193	Dec.. 12,957	4.6

It will be noted that the gain on the Reading is very nearly equal to the whole increase in the anthracite tonnage.

The anthracite coal tonnage of the Belvidere Division, Pennsylvania Railroad, for the ten months ending Oct. 27, was:

	1877.	1876.	Inc. or Dec.	P. c.
Coal Port for shipment	27,214	238,577	Dec.. 211,363	88.6
South Amboy for shipment	462,732	357,691	Inc .. 105,041	29.4
Local distribution on New Jersey lines	157,841	142,958	Inc .. 14,883	10.4
Company's use on New Jersey lines	60,617	56,107	Inc .. 4,510	8.0
Totals	708,404	795,333	Dec.. 86,929	10.9

Of the total this year 560,413 tons were from the Lehigh and 147,991 tons from the Wyoming region.

The miners in the pools on the Monongahela River above Pittsburgh have struck and demand a uniform rate of three cents per bushel; 76 pounds to the bushel and the pit scales to be checked. Some of the coal operators are now paying three and others 2¾ cents per bushel.

The Lehigh Valley Railroad Company has reduced its tolls on coal ten cents per ton from Nov. 1.

THE SCRAP HEAP.

Railroad Manufactures.

The Keystone Bridge Co., of Pittsburgh and Philadelphia, has recently closed contracts for the construction of one mile of the Gilbert Elevated Railroad in New York; for an iron bridge of 13 spans over the Monongahela River at Port Perry, Pa., for the Pennsylvania Railroad, and for a double-track iron bridge of four fixed and one draw-span over the Raritan River at New Brunswick, N. J., for the same road. The company has several other important contracts on hand.

The Vermont Central shops at St. Albans, Vt., recently turned out a new mogul freight engine with 17 by 24 in cylinders.

The old James Ward rolling mill and furnace at Niles, O., were sold at assignee's sale Oct. 24. The rolling mill was sold to P. M. Hitchcock, of Cleveland, for $10,000; the furnace to A. M. Robbins, of Niles, for $4,500.

The old forge at Bloomingdale, N. J., has been leased by Peter Oberg & Co., of Paterson, who have started it up and are making charcoal iron blooms.

The Cambria Iron Co., at Johnstown, Pa., has completed a new mill for rolling wire rods of Bessemer steel. The company has erected a brick building over the steel blooming mill in place of the old wooden shed. The new building was put up without stopping the work of the mill.

The Nashua (N. H.) Iron & Steel Co. has orders ahead for merchant iron, and is running its bar mill extra time.

The new buildings of the Pittsburgh Steel Casting Co. are nearly completed. The main building is 256 by 122 feet, of brick with iron truss roof, and there are two smaller buildings wholly of iron, one 50 by 86 feet over the annealing ovens, and one 40 by 41 feet over the Siemens-Martin furnaces. These buildings replace the wooden ones burned last June, and have been put up by Wm. B. Scaife & Sons, of Pittsburgh.

No less than eight furnaces will go into blast in the Hocking Valley region in Ohio before Jan. 1, and two more soon after that time.

The Brooks Locomotive Works, at Dunkirk, N. Y., have an order for narrow-gauge engines for the Olean, Bradford & Warren road.

The Baltimore & Ohio rail mill at Cumberland, Md., having worked up all the material on hand, has been finally closed.

The National Tube Works, at McKeesport, Pa., are running night and day. Last week 90 car-loads of pipe were shipped.

The Harrisburg (Pa.) Car Manufacturing Co. recently received an order for 100 box cars for the New York Central & Hudson River road.

The new car-wheel works of T. F. Griffin, Sons & Co., at Detroit, are completed. The senior member of the firm is said to be the oldest car-wheel maker in the country, his connection with the business dating as far back as 1847.

The Pennsylvania Railroad shops at Altoona recently turned out six new postal cars in less than three weeks from the time the order was given.

A St. Louis dispatch says that the creditors of the Vulcan Iron Works have made arrangements with the company, which will permit it to resume and continue work. The bondholders agree to reduce the rate of interest from 10 to 7 per cent.; the floating debt creditors will accept 30 per cent. of their claims in cash and 70 per cent. in stock, the stockholders surrendering enough of their stock to make up the amount needed.

The Delaware Bridge Co. has completed this week the long iron bridge over the Susquehanna at Rockville, on the Pennsylvania road. The bridge was recently described; it has 21 spans of 160 feet and two of 155 feet each. The contract allowed until Dec. 1 for its completion.

Mr. R. J. Green, of the Gaylord Iron Works, Portsmouth, O., has bought the Elizabeth Furnace and the Estuline Furnace properties in Augusta County, Va., paying $130,000 for the former and $60,000 for the latter. Both properties include large tracts of ore and wood lands.

The Wood & Light Machine Co., at Worcester, Mass., has recently built a quartering machine for the Chicago, Burlington & Quincy, and is repairing a large number of machine tools damaged by the recent burning of the Boston & Albany repair shops at Springfield.

Ramsey & Scarlett are building a car-truck shifting apparatus at Latrobe, Pa., the junction of the new Ligonier Valley road with the Pennsylvania. They have an order for another

to be put up at Wilmington, N. C., for the Wilmington & Weldon road.

The Pittsburgh *Telegraph* of Nov. 3 says: "At a meeting of the stockholders of the Pittsburgh & McKeesport Car Co., at their office in Pittsburgh, last Wednesday, it was decided not to rebuild their works, and a committee of three were appointed to close up the affairs of the company. Since that time the matter has been reconsidered, those of the stockholders favoring rebuilding having concluded to carry on the business."

Wood, Scull & Snyder, of Philadelphia, are fitting up a train on the Camden & Atlantic road with their patent steam heating apparatus.

The Leetonia (O.) Rolling Mill is still idle, with no present prospect of resuming work.

Prices.

The *Engineering and Mining Journal* reports that the October sales of steel rails amounted to at least $50,000, and that 20,000 tons were sold in the last week of that month, with prospects of a considerable addition to sales in the first week of November. Prices ranged from $40 to $41 a ton at the mills. Quotations for iron rails are $33 to $36 a ton. Nominal quotations for old rails are $18, wrought scrap, $22.50 to $23.50.

No. 1 foundry pig, $18 to $19; No. 2, $17 to $18; forge $16 to $17.

Continuous Brakes in England.

For several years past the attention of the railroad companies of England has been engaged in various ways in efforts to determine the best form of continuous brakes for use on their lines. Very elaborate and exhaustive experiments have been made with the different systems of such brakes, but nevertheless there seems to be little agreement between them in the conclusions, or lack of conclusions, which they have reached, and this fact seems to be the great difficulty in the way of introducing any of the systems. For this reason the Board of Trade, which in that country exercises more or less supervision over the management of railroads, has addressed a circular to all the railroad companies, in which attention is called to the fact that the Board has been led to conclude that three-fourths of the accidents investigated by it could have been avoided, or "the results mitigated, if the passenger trains concerned had been provided with continuous brakes."

It is further said that the statements of the various companies, with reference to the different systems of continuous brakes, not only do not agree, but they are to some extent inconsistent with each other. The efficiency of the brakes, it is thought, will be much impaired if the brake fittings are not similar on the rolling stock of lines which are continuous, and which must therefore interchange cars. It is therefore intimated very plainly that if the different companies do not make some effort to agree upon some system, they "will call down upon themselves an interference which the Board of Trade desires to avoid."

The conditions which a continuous brake should fulfill are stated by the Board as follows:

"(*a*) The brakes to be efficient in stopping trains, instantaneous in their action, and capable of being applied without difficulty by engine-drivers or guards. (*b*) In case of accident, to be instantaneously self-acting. (*c*) The brakes to be put on and taken off, with facility, in the engine and every vehicle of a train. (*d*) The brakes to be regularly used in daily working. (*e*) The materials to be of a durable character, so as to be easily maintained and kept in order."

A Locomotive Engineer's Epitaph.

A correspondent writes to the Alton (Ill.) *Telegraph* as follows: "Rambling in the cemetery recently, I looked for a headstone which I remembered several years ago, containing an epitaph so peculiar and original as not to be forgotten. Over a sunken grave leans an almost fallen slab, sacred to the memory of one whose life closed at 28 years of age, evidently an engineer. Wondering how many Alton people ever read it, I send you a copy:

My engine is now cold and still,
No water does my boiler fill,
My coke affords its flame no more,
My days of usefulness are o'er;
My wheels deny their noted speed,
No more my guiding hand they heed;
My whistle—it has lost its tone,
Its shrill and thrilling sound is gone;
My valves are now thrown open wide,
My flanges all refuse to glide;
My clacks—alas! though once so strong,
Refuse their aid in the busy throng;
No more I feel each urging breath,
My steam is now condensed in death;
Life's railway o'er, each station past,
In death I'm stopped and rest at last.

"This epitaph was written by an engineer on the old Chicago & Mississippi Railroad, who was fatally injured by an accident on the road near what was then known as Prairie Station, now Nilwood. Two of the engines on the line at that time, Nos. 9 and 10, had six-foot drivers, and both these machines were notoriously unsteady on the road, and both left the track on several occasions. It was No. 9 which fatally injured the author of the above epitaph, and while he lay awaiting the death which he knew to be inevitable, he wrote the lines which are engraved on his tombstone."

OLD AND NEW ROADS.

Alabama & Chattanooga.

The Erlanger plan of reorganization has apparently met with some success, for a limited liability company has been organized in London for the purpose of owning and working this road, as was provided for in that plan.

Atlantic & Pacific.

The final report of the Master in the foreclosure suit has been filed in the United States Circuit Court at St. Louis. The report shows that holders of $2,458,000 out of $2,535,000 first-mortgage land-grant bonds, and $2,092,500 out of $2,125,000 second-mortgage land-grant bonds joined in the purchase of the road and have surrendered their bonds to the trustees, in exchange for certificates or securities of the new company. After deducting all the Receivers' debts, costs and expenses of court and other matters properly chargeable on the purchase money, the Master finds that the outstanding holders of the first-mortgage land-grant bonds are entitled to receive $55.57 53-100 for each $1,000 bond, and those of the second-mortgage bonds $46.14 93-100 per $1,000 bonds, these amounts, of course, being payable only to the holders who did not join in the purchase. The Court entered a decree in accordance with the report, directing also a final allowance of $39.19 for costs and $750 for the Master's services.

Boston, Hoosac Tunnel & Western.

The Albany (N. Y.) *Evening Journal* says: "Mr. M. F. Jones, engineer in charge of the construction of the new bridge on the Boston, Hoosac Tunnel & Western Railroad over the Hudson River, two miles above Mechanicville, is vigorously at work on the new enterprise. This bridge is to be 1,200 feet in length from the eastern shore across to the west side of the highway on the west bank, and will be built of iron on seven stone piers. A force of 25 men were put to work on Friday, clearing away the broken slate-rock on the west bank for the base of the first and second piers, and in building a blacksmith shop. The bridge is about 1,500 feet below the Hudson Valley paper mill. Sidney Dillon and J. D. Ripley are the contractors for building the bridge, which is to be a deck, double-tracked iron one. The railroad track from Mechanicville to Schuylerville will be laid within six weeks on the hitherto partially graded railroad of the Schuylerville & Upper Hudson Railroad, which has been acquired for that purpose. From Mechanicville the new road will follow the Rensselaer & Saratoga Railroad to the Dwaaskill Creek, two miles east of Round Lake, and thence to Jonesville and intersect the Saratoga & Schenectady track near South Ballston, a distance of about 15 miles of new track. Six miles of new track will also be required to be graded between the Hudson and Schaghticoke Point. General Burt and John B. Alley are at Mechanicville superintending the work."

Central Pacific.

A regular local train was to be put on this week to run between Oakland, Cal., and Martinez, 30 miles, on the completed section of the new loop line.

On the western end of this loop line the track is now all laid from the main line at Bantas northwest to Antioch, 35 miles. There is a gap of 15 miles between Martinez and Antioch, on which, we believe, there is some heavy work to be done. The new loop line will be about 80 miles long from Oakland to Bantas, some 12 miles longer than the present main line, but it will be free from the heavy grades of the present line through the Livermore Pass and will probably be used for most of the freight business. It is also to be used as a rail connection with the California Pacific by the construction of a branch from that road at Suisun to Benicia and a point opposite Martinez, the connection to be completed by a steam ferry across the straits of Carquinez. The construction of the branch from Suisun to Benicia has been already begun.

Chicago, Milwaukee & St. Paul.

A bill was filed or was to be filed in the United States Circuit Court last week by Walter C. Woolley and others, stockholders of the old La Crosse & Milwaukee Company, against this company and others. The bill alleges fraud in the foreclosure; it sale of the La Crosse road and its transfer to the present company, and asks for an injunction against any further issue of consolidated bonds; for the appointment of a receiver and an accounting for the earnings of the road.

This is the old suit which has been coming up periodically for the last ten years. It is probably brought up now for stock-jobbing purposes.

Chicago & Northwestern.

This company recently filed in the Illinois Superior Court a bill against the Joliet Iron & Steel Co. and others. It appears that the company owes for a lot of rails and is willing to pay for them, but the money is demanded by several parties and the bill is filed partly to get an order from the court to settle who is entitled to the money, and partly to enable the railroad company to secure some equivalent for the guarantee of the rails given by the Iron & Steel Company.

Colorado Central.

The extension of the standard-gauge line from Longmont, Col., to the Union Pacific at Hazard, six miles west of Cheyenne, is completed, and the first train ran through Nov. 1. This extension is about 70 miles long, and it completes a new line 126 miles long connecting the Union Pacific with Denver, Col. This line is about 20 miles longer than the Denver Pacific, and runs from Denver nearly due west 16 miles to Golden and then turns northward, running from that point nearly parallel with the Denver Pacific. The Union Pacific controls the new line and will send all its Denver business over it, leaving the Denver Pacific without through business and probably with very little of any kind. Its completion will probably increase the competition for Colorado business between the Union and Kansas Pacific.

Corpus Christi, San Diego & Rio Grande.

The track on this road is now laid to Banquette, Tex., 25 miles westward from Corpus Christi, and cars are running regularly to that point. The work of tracklaying is progressing from Banquette toward Collins, and the company hopes to reach the Precenos, 42 miles, by the end of the year.

Cumberland & Pennsylvania.

The trustees under the second mortgage give notice that they will receive proposals for the sale to the sinking fund of $20,000 of the bonds issued under that mortgage. Proposals may be sent to the office of the Consolidation Coal Company, No. 71 Broadway, New York, until Nov. 10.

Dayton & Southeastern.

The track on this road is laid and trains are running to Mussellman's, the crossing of the Marietta & Cincinnati road. This point is 68¼ miles east by south from Dayton, O., and 2¼ miles beyond the recent terminus at Frankfort. There are still 46 miles to be completed, from Mussellman's to Wellston, part of which is graded.

Delaware, Lackawanna & Western.

This company's new consolidated mortgage bonds are now being offered for sale through Robert Winthrop & Co., of New York, at 105 and interest.

Detroit & Bay City.

The contract for building the proposed branch from Vassar, Mich., northeast up Cass River to Caro has been let to Walton & Lacy, of Detroit, who have already begun work. The branch will be about 13 miles long.

Dividends.

Dividends have been declared as follows:

Cleveland & Pittsburgh, 1¾ per cent., quarterly, on the new guaranteed stock, payable Dec. 1.

Cincinnati, Sandusky & Cleveland, 3 per cent., semi-annual, on the preferred stock, payable Nov. 1.

East & West Texas.

The line of this road is now being located from Carlisle's Bluff, Tex., on the Angelina River to the old town of Nacogdoches. A suitable crossing of the Neches River has been found and the grading was to have been begun about Nov. 5.

East Line & Red River.

Work has recently been begun on an extension from Daingerfield, Texas, westward to Pittsburgh, in Upshur County.

East River Bridge.

At a meeting of the trustees in Brooklyn, Nov. 5, a report was presented on the relative merits of Bessemer and crucible steel for the suspending cables. It was resolved to advertise for bids for the wire required for both kinds of steel. Contracts were awarded to Pierce, Rowe & Co., of Frankfort, Me., for pier, abutment, arch and other stone to the amount of $290,631.30; to the Collins Granite Co., of Blue Hill, Me., for cut stone, amount $222,975, and to the Bodwell Granite Co., of Rockland, Me., for base stone, rock faced work and bond stone, amount of contract, $155,548.60.

Emlenton & Clarion.

This road, formerly known as the Emlenton & Shippenville, is now completed and in operation from Emlenton, Pa., on the Allegheny Valley road, northeast to Shippenville, 19¼ miles. The road serves a section of the Clarion oil region and is reported as doing a large business.

Erie.

The Court has given Receiver Jewett permission to lay a third rail for standard gauge from Waverley, N. Y., eastward to Binghamton, 41 miles, also to make a traffic contract with the Delaware & Hudson Canal Company. This authority was necessary to complete the proposed northern and Boston connections over the Albany & Susquehanna road.

Flint & Pere Marquette.

The trustees will receive proposals, at their office in New Bedford, Mass., until Nov. 22, for the sale to them for cancellation of $15,000 of the 8 per cent. land-grant bonds of the issue of Sept. 4, 1868; $5,000 of which must be from Nos. 1 to 600, and $10,000 from Nos. 1,201 to 1,800. Bids are to be made flat.

Fort Dodge & Fort Ridgely.

The grading of this road is now completed from Fort Dodge, Ia., northward about 20 miles into Humboldt County. The ties are on the ground, and the iron for 20 miles has been bought, with an engine and cars, and track-laying will be begun very soon.

Foreclosure Sales.

Sales of railroad property under foreclosure are reported as follows:

St. Joseph & Topeka, at Troy, Kan., Oct. 29, under foreclosure of mortgage. Bought for $36,000 by H. H. Butterworth and John S. Damon. The road is 13 miles long, from Wathena, Kan., on the St. Joseph & Western road, to Doniphan Junction on the Atchison & Nebraska, and forms, with those roads, a line 25 miles long between St. Joseph and Atchison. The city of St. Joseph had $50,000 interest in the road. It is worth very little and has not, we believe, been very regularly operated for some time.

Lake Erie, Evansville & Southwestern, at Seymour, Ind., Oct. 31, under a decree of foreclosure granted by the United States Circuit Court. Purchased for $6,100, subject to certain claims now before the Court. The road is completed from Evansville, Ind., to Boonville, 20 miles.

Freehold & New York.

This road has been completed by an extension of one mile from the crossing of the New Jersey Central's Long Branch Division near Matawan, N. J., to Keyport. The road has now two connections with New York, by the New Jersey Central from Matawan, and by steamboat from Keyport.

Hannibal & St. Joseph.

The appointment of the Receiver being superseded pending the hearing of the appeal, the old officers have resumed possession and all appointments made by the Receiver are rescinded.

As expected, at the annual meeting held Nov. 5 an almost entirely new board was chosen. Only three of the old directors remain, and they had been but a short time in the board. The new board are nearly all New Yorkers, and will, it is said, make a complete change in the management of the road. It is possible that the election may be contested, Gen. Singleton, of Quincy, having filed a protest against all the proceedings of the meeting.

Housatonic.

It is reported that a survey is being made for an extension of the State Line Branch from State Line northward to Lebanon, N. Y., to connect there with the Harlem Extension road. The distance is about 17 miles.

Hudson Tunnel.

In the long pending suits between this company, the Delaware, Lackawanna & Western, and the Jersey Shore Improvement Company, a compromise has been arranged. The Hudson Tunnel Railroad Company is to pay the amounts awarded by the commission for lands taken from the other companies, they on their part agreeing to withdraw all legal proceedings. The Tunnel Company will now have an opportunity of showing whether it can command the money and the engineering skill necessary to carry on the work.

Kaskaskia & Chester.

Work has been begun on a railroad from the old town of Kaskaskia, Ill., on the Mississippi River, southeast to Chester, a distance of about eight miles. The road is to be built by a separate company organized for the purpose, but will be worked as a branch of the Iron Mountain, Chester & Eastern, with which it will connect at Chester.

Laurens.

Orders have been given to resume work on this road and complete it at once to Laurens. The trestle bridges are now being erected, and, as soon as they are finished, the work of laying the rails will begin. About 14 miles of track is to be laid to complete the road from Clinton Station to Laurens, but everything is ready and the work will not take very long.

Louisville, Cincinnati & Lexington.

Receiver McLeod's report for October is as follows:

Balance, Oct. 1		$214,815 85
Receipts on account of Receiver		42,775 81
" " " purchasers		111,751 98
Total		$369,343 64
Disbursements, account of Receiver	$115,893 76	
" " purchasers	8,698 97	
		124,592 73
Balance, Nov. 1		$244,750 98

Of this balance $141,697.90 is to the credit of the Receiver and $103,053.01 to credit of the purchasers. The road is now in possession of the new company formed by the purchasers.

Madeira & Mamore.

The Philadelphia *Times* of Nov. 7 says: "News is just cabled from London in reference to the Madeira Rapids Railroad contract. This contract is between the Madeira & Mamore Railroad Company and the National Bolivian Navigation Company and Messrs. P. & T. Collins, of this city, and foots up an outlay for the road of $6,000,000. The Philadelphia contractors agree to complete the gradation, masonry and superstructure and furnish the equipment of a road 180 miles along the eastern shore of the Madeira River, in Brazil, from the point of navigation below the rapids of that river to the point of navigation on the Mamore River, a branch of the Madeira above. The Madeira River has its source in the immense water-shed of Bolivia, east of the Andes, leaves Bolivia at the northeastern point and runs across the table-lands of Brazil to the Amazon, which it joins near Barra, about 700 miles from the Atlantic. The Madeira is navigable for steamers as far up as Bairamao, but just above that town is the Cataract de Inferno and a series of falls which render the river useless for 180 miles. The Mamore River is the chief branch of the Madeira, and joins the latter above the falls on the borders of Bolivia. On the Mamore are the Bananeira Falls. The railroad is to be run from Bananeira Falls to the head of navigation on the Madeira, a distance about twice as great as that from this city to New York.

"When it is constructed the trade of Bolivia, which now has no convenient outlet, will flow easily down the Maderia and Amazon to the Atlantic. The aggregate length of the affluents of the Madeira, with their tributaries, is 5,500 miles, and 3,000 miles navigated by steamers would open the unequaled mineral wealth and agricultural products of the country to the commerce of any nation energetic enough to bid for such a great trade. Bolivia is the most peaceful and at the same time richest of the South American republics. It is shut out from the world by the Andes on the west, having, with an area of 480,000 square miles and a population of nearly 3,000,000, a short Pacific coast line of 50 miles, which can only be reached

by mountain journeys. * * In 1868 the internal trade of Bolivia reached about 15,000,000 pounds, and in 1872 exports amounting to 3,750,000 pounds were taken across the Andes on mule and llama back. Hence the importance of spanning the Madeira rapids was recognized years ago. * * *

"The payment to the Messrs. Collins will be about three-quarters in cash, and the money to pay them is now in hand. The debentures guaranteed by the Brazilian Government stand for the remainder.

"The road is to be of narrow-gauge construction, the iron rails being 45 lbs. per yard. The materials will be furnished by the Philadelphia & Reading Coal & Iron Company, according to an agreement with the contractors, and the cash for the materials, about $5,000,000, will be paid upon shipment from this port. The capture of this huge contract from the English by Philadelphians is deemed a significant matter in South American trade, and is thought to point toward the establishment of direct ocean communication between Philadelphia and the Amazon River."

An English company undertook to build this road or a similar one several years ago, but for some reason it failed to complete it.

Massachusetts Central.

At the recent annual meeting Ex-Comptroller Andrew H. Green, of New York, and five other new directors were chosen, and it is understood that Mr. Green is to be President of the company. It is said that the New York party is prepared to invest money enough to complete the road, and that they also expect to control it. The present outstanding bonds are to be retired and a new issue of first-mortgage bonds made.

Maryland & Delaware.

At a recent meeting of the board it was resolved to repair and put in order at once the nine miles of track from Easton, Md., to Oxford, over which trains have not been run for some time. Considerable work is needed on the track and bridges, and about three weeks will be required to do it. Daily trains will then be run through to Oxford, chiefly for the oyster and fish trade, which is considerable in the winter.

Memphis & Little Rock.

The offices of this road having been destroyed by fire, with a part of the records and correspondence of the Ticket Department, Mr. M. S. Jay, General Passenger and Ticket Agent, requests all companies doing business with the road to furnish him with their last report of ticket sales over this road; a copy of their local passenger tariff; a copy of October rate sheets; of current or condensed time card, and of apportionment of through rates.

Mobile & Ohio.

At Memphis, Tenn., Nov. 1, in the United States Circuit Court, the final decree in the suit of Duncan, Iselin & Walker, trustees, against this company was entered. The decree confirms the lien of the Tennessee substitution bonds on the road in that State, and the opinion in the case was delivered some months ago.

Minneapolis & St. Louis.

Work on the extension of this road southward is progressing rapidly and the company expects to have the track completed from Waseca to Albert Lea, Minn., next week. Arrangements have already been made to put on through trains from Minneapolis to Burlington, Ia.; also for through connections to Chicago and St. Louis.

Missouri Pacific.

The St. Louis *Republican* reports that this company will shortly abandon the branch from Kirkwood to Carondelet. This branch was built several years ago for the purpose of giving the company a second terminus at Carondelet for freight traffic, besides a line to the furnaces and other factories there. It has been found, however, that most of the business to Carondelet does not come from the westward, but from St. Louis, and for this the branch is not convenient, its connection with the main line at Kirkwood being 13 miles out. It is now proposed to give it up and build a new branch about five miles long from Taylorwick to Carondelet, which could be conveniently used both for Western and St. Louis business.

New York Central & Hudson River.

This company has established a through freight office in Philadelphia, and the red and white lines are also represented through the same office. Freight between Philadelphia and points east of Utica is dispatched by the Bound Brook Line and New York; to and from points west of Utica by the North Pennsylvania and Lehigh Valley roads, connecting with the Central at Geneva. Through rates and through bills of lading are given on both east and west-bound freight. The Pennsylvania Railroad now has to meet the competition of all three of the other trunk lines in Philadelphia.

New Brunswick.

The road is now completed to Grand Falls, N. B., on the St. John River, 21 miles north of Andover Junction and 121 miles from the southern terminus at Gibson, opposite Fredericton. The company now has in operation the main line from Gibson to Grand Falls, 121 miles; the Woodstock Branch, from Junction to Woodstock, 11 miles, and the Aroostook Branch, from Andover Junction to Caribou, 19 miles, making 151 miles in all. Work is now in progress on the extension from Grand Falls to Edmunston, about 30 miles. The road will cross the St. John about a mile above Grand Falls and the bridge there will be built this winter. At Edmunston the road will leave the St. John River and run northwest up the Madawaska and by Lake Temiscouata to Riviere du Loup.

North Louisiana.

Books of subscription to the stock of this company have been opened at Shreveport, La., and the temporary officers have arranged to begin work at once. The road is being surveyed and the first contracts for grading have been let. The road is to fill the gap of 118 miles between Shreveport and Monroe, the present terminus of the Vicksburg, Shreveport & Texas road.

Pennsylvania.

For the week ending Saturday, Oct. 27, 162 freight trains passed Johnstown eastward on the Pennsylvania Railroad, consisting of 5,430 loaded and 464 empty cars, being a total of 5,894, and an increase over the week ending Oct. 20 of 11 trains, 244 loaded and 231 empty cars, or 475 more cars in all—equivalent to an increase of 9 per cent. in cars moved. During the same week there were 164 trains westward, with 2,541 loaded and 3,257 empty cars, making a total of 5,798. This was an increase over the previous week of 26 trains, with 70 loaded and 403 empty cars, an aggregate of 473 cars, also 9 per cent.

The Port Perry connection with the Pittsburgh, Virginia & Charleston road is to be completed shortly, contracts having been let for the bridge over the Monongahela at Port Perry. When this is completed, the through freight to or from the Pittsburgh, Cincinnati & St. Louis road will pass over the Pittsburgh, Virginia & Charleston to Port Perry, reaching the Pennsylvania track at Brinton, 12 miles east of Pittsburgh. By this arrangement the transfer of a large amount of through freight through Pittsburgh will be avoided.

The high bridge over the Raritan River and the Delaware & Raritan Canal at New Brunswick, N. J., is to be replaced by a new iron bridge. The old bridge has been standing a long time and was regarded as a very fine bridge in its day.

Smith & McGaw, contractors, of Philadelphia, have just completed a stone arch bridge over the Juniata, near Ironville, Pa. It is 290 feet long, with three arches, each 58 feet wide at the base and 30 feet high from spring-line to crown. It is built of freestone from Gallitzin. The same contractors have begun work on a similar bridge near Petersburg.

The contract for the new car shops at Pittsburgh has been let to George Cochrane, of Allegheny. The shops are to be 179 by 70 feet and one story high. The passenger sheds, which will be three in number, 500 feet long and 128 feet over all, are to be built by R. W. Gibson, of Lewistown, Pa.

Penn Yan & New York.

The New York Canal Commission has voted to sell the Crooked Lake Canal to this company for $3,333. The canal is 7½ miles long, and the company desires to use a part of it as a road-bed for its projected railroad from Penn Yan, N. Y., to Dresden.

Pittsburgh & Castle Shannon.

Work on the extension of this road has been pushed rapidly of late, and the rails are now laid to Munntown in Washington County, Pa., 15 miles south by west from the old terminus at Castle Shannon, and 21 miles from Pittsburgh. About 11 miles remain to reach Washington, much of which is graded. The lumber for the bridges and trestles is nearly all cut and framed. The extension is being built by a separate corporation organized for the purpose and known as the Pittsburgh, Castle Shannon & Washington Company, which has substantially the same organization and ownership as the old company. The latter will operate the road. The line is nearly parallel to the Chartiers Railroad and a few miles east of that road.

Quebec, Montreal, Ottawa & Occidental.

The track of the Western Division (the old Northern Colonization road) is now laid to the mouth of the Gatineau River on the Ottawa, nearly opposite the city of Ottawa. This is about 50 miles beyond the late terminus at Calumet, and 110 miles from the eastern terminus at Hochelaga, near Montreal.

Quincy & Warsaw.

A company by this name now proposes to build a narrow-gauge road from Quincy, Ill., northward along the Mississippi to Warsaw, about 30 miles. The plan is to build the road along the river bank in such a manner that the road-bed will serve as a levee to protect the bottom lands from overflow by the river. The company offers to build the line if the owners of the land liable to overflow will contribute each $2 per acre, payable in installments. If all the landholders join as proposed, the amount thus secured will be more than $3,000 per mile toward the construction of the road.

Rhode Island & Massachusetts.

It is now proposed to extend this road from Franklin, Mass., north by west about eight miles to Metcalf on the Milford Branch of the Boston & Albany. This extension, it is claimed, will give a direct route from Providence to Lowell by way of South Framingham, besides accommodating some local interests. There is already, however, a line quite as direct over the Providence & Worcester branch line to Milford.

Sacramento Valley.

The San Francisco *Post* of Oct. 30 says: "Louis McLane, as surviving Trustee of the Sacramento Valley and the Placerville & Sacramento railroad companies, has brought suit in the Twelfth District Court against the companies to enforce the execution of the conditions of a certain trust mortgage. The other Trustee was D. J. Barney, of New York. The roads were sold to Wm. Alvord for $250,000, and by him transferred to Stanford, Huntington and Hopkins, in whose hands the two roads are now consolidated. There were 720 trust bonds, and 111 of them have not been issued. The object of the suit is to get the roads back under the control of the plaintiff, so that the full value of the bonds may be secured and the rights of the parties directly interested protected. It is alleged that the purchase by Alvord, and the assignment by him to the present de facto owners, did not destroy any of the rights and privileges conferred by the mortgage to the plaintiff and his co-trustee."

Scioto Valley.

The track is now all laid on the Southern Division from Chillicothe, O., south to Portsmouth, 48 miles. The road will be formally opened next week and trains will begin to run through to Portsmouth. The road is now completed according to the original intention from Columbus to Portsmouth, 98 miles. There is some talk of an extension up the Ohio River from Portsmouth to a point opposite Huntington, W. Va.

Southeastern, of Canada.

Trains are now run regularly on the section of this road in Canada and are guarded by a detachment of Canadian militia. On the Vermont side of the line the road is broken, and the places where the track has been removed are guarded by a sheriff's posse against any attempt to relay the rails.

The Passumpsic Company claims that the Southeastern had no right to break the connection in the first place; that no statement of accounts had been asked for; that, by the terms of the lease, it could not be terminated until the Southeastern had repaid the loan of $100,000 made by the lessees at the time the lease was first made, and that the earnings of the road had never been sufficient to pay the amount which it was agreed should be retained by the lessees.

The sudden death of Col. A. B. Foster, Manager and chief owner of the Southeastern, is noted elsewhere. It is said to have resulted directly from undue excitement caused by the present troubles. The board has resolved to continue the fight begun by Col. Foster, and will appeal to the Canadian courts for a settlement of the troubles of the company. The appointment of a receiver will probably be asked for, as a preliminary step.

Southern Maryland.

The Maryland Circuit Court has rescinded the order for the sale of this road made in June last on application of certain creditors of the company. This order of sale was afterwards temporarily enjoined and is now set aside. The Court has also supported the claim of S. S. Smoot and others to $700,000 of the securities of the company under Col. Smoot's contract for the construction of the road.

Southern, of Long Island.

In Brooklyn, Oct. 31, application was made for the appointment of receivers for this road by Mr. James H. Wright, who holds by assignment a judgment of $347,307.48 recently sued out against the company by Conrad Poppenhusen. The Court granted the application and named as Receivers Col. Thomas R. Sharp and Mr. F. D. Tappen, of Brooklyn. Col. Sharp is also Receiver of the Long Island road, and the appointment will probably not affect the management of the Southern road, or its lease to the Long Island.

Southern Pacific.

Part of the grading force lately employed near Fort Yuma is now at work on an extension of the San Diego Division from Anaheim, Cal., south by east eight miles to Santa Ana.

St. Louis, Hannibal & Keokuk.

It is reported that this company will build an extension of its road from Hannibal, Mo., to West Quincy, and that the extension will be used by the trains of the Missouri, Kansas & Texas. The Chicago, Burlington & Quincy already has a line between Hannibal and Quincy on the east side of the Mississippi and the St. Louis, Keokuk & Northwestern another on the west side.

Texas & Pacific.

Local papers report that this company has offered to extend the main line from its present terminus at Fort Worth, Tex., westward to Weatherford in Parker County, about 30 miles, provided the people interested in the extension will subscribe enough to grade the road and provide the ties.

United New Jersey.

It is announced that the Pennsylvania Railroad Company has instructed its counsel to defend the suit in New Jersey to set aside the lease, which is still pending. It is said that the United New Jersey stockholders have been called on by the officers of their company for an assessment of 10 cents per share to employ counsel for the same purpose.

The 257 shares of the stock held by the Longstreets, who brought the New Jersey suit, were bought, as heretofore noted, by Mr. Andrew Carnegie, of Pittsburgh, who still holds them. Mr. Carnegie has written a letter to Vice-President Dennis, of the United Company, offering the stock to the company at the cost to him. He states further that the stock was bought by him without any personal interest or desire to become a party to the litigation. The Longstreets, it is further said, sold the stock to him at a price about its value as an investment added to their expenses in the suit.

This letter contradicts previous statements that Mr. Carnegie, having established himself as successor to the Longstreets, had demanded a large sum of money or an important office from the company as the price of a discontinuance of the suit.

Union Pacific.

Notice is given that 58 Omaha Bridge bonds have been drawn for redemption in accordance with the terms of the mortgage, and will be redeemed April 1, 1878, at the office of Drexel, Morgan & Co., New York, or at the London & San Francisco Bank, London. The numbers of the bonds drawn are: 13, 14, 22, 80, 117, 140, 192, 206, 346, 367, 375, 387, 432, 437, 459, 460, 499, 503, 518, 633, 640, 665, 702, 789, 870, 910, 953, 982, 1027, 1061, 1120, 1135, 1181, 1194, 1268, 1306, 1319, 1361, 1396, 1474, 1493, 1503, 1512, 1549, 1558, 1689, 1707, 1765, 1806, 1888, 2098, 2158, 2185, 2198, 2262, 2313, 2410 and 2423.

Utah Northern.

Arrangements have been made to transfer this road to a new company known as the Utah & Northern, which is already organized. The transfer is to be effected by a foreclosure and sale of the road. Mr. Richardson, who holds all or nearly all the bonds, agrees to give up the accrued interest; the old construction company, which graded the road from Ogden to Franklin, is to receive $6,000 per mile in stock of the new company, and stock is also to be issued for the par value of the outstanding vouchers and claims. The new company will at once proceed with the extension of the road.

It has been decided to abandon the Soda Springs route on account of the high grades and heavy work required. A new line has been surveyed through Marsh Valley, which is considered much better, though some heavy rock work will be needed through Portneuf Canon. Contracts for grading on the extension are to be let very soon.

Waukon & Mississippi.

The track of this narrow-gauge road is reported laid from Waukon in Allamakee County, Ia., southeast through the Paint Creek valley to the Chicago, Dubuque & Minnesota road at Adams. The distance is about 23 miles, and the road has been built chiefly by the people along the line.

Waynesburg & Washington.

The track on this road is now all laid from Washington, Pa., southward to Waynesburg in Greene County, 21 miles. The road has been several years under construction and runs through a prosperous farming country hitherto without railroad connections. The road will be opened for traffic soon and the formal opening will be made the occasion for a local gathering and grand celebration.

West End.

It is proposed to extend this narrow-gauge suburban road from its present terminus at Normandy, near St. Louis, to Florissant. The estimated cost is $25,000, of which about $13,000 have already been raised.

Western, of Minnesota.

At a meeting of the board in St. Paul last week arrangements were made for leasing the road to the Northern Pacific Company. It was resolved to make arrangements for selling the company's lands through the Northern Pacific Land Department. It was also resolved that actual settlers within the limits of the company's grant be allowed to buy the lands now occupied by them on time, at $3 per acre inside and $2 per acre outside the ten-mile limit.

Woodstock.

This company has been trying for some time to extend its road across the Central Vermont track at White River Junction, in order to secure a connection with the Northern (New Hampshire) road. The Central has used every means in its power to prevent this and the case is still pending. The crossing was allowed and damages settled by a commission some time ago, but the Central took an appeal and the case has not yet been tried. At present the Woodstock road has no connection, except with the Central, and is dependent upon that company for all its terminal facilities.

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Western, of Alabama.

This road extends from West Point, Ga., west by south through Montgomery to Selma, Ala., 138 miles, with a branch from Opelika, Ala., east by south to Columbus, Ga., 29 miles, making 167 miles in all. It is owned jointly by the Georgia Railroad Company and the Central Railroad Company of Georgia, who bought it at foreclosure sale, subject to certain mortgages. The road is managed for joint account of the two companies by Gen. E. P. Alexander, whose second annual report covers the year ending Aug. 31, 1877.

The equipment consists of 19 engines; 8 first-class and 7 second-class passenger, 7 mail and baggage and 1 express car; 165 box, 52 flat, 16 coal and 6 caboose cars; 1 pay, 10 shanty and 10 dump cars. During the year 25 cars were built and 18 condemned; one engine was condemned and one exchanged in part payment for a heavier one. Five of the engines are old light engines, which are to be rebuilt during the current year.

The statement of the condition of the road at the close of the year is as follows:

Paid on purchase by Central R. R. Co.		$361,005.82
" " " " Georgia R. R. Co.		361,005.81
Total ($4,328 per mile)		$722,011.63
Bonds outstanding ($15,287 per mile)		2,553,000.00
Income account		100,524.45
Due on open accounts		28,127.96
Total ($20,381 per mile)		$3,403,664.04
Road and outfit ($19,611 per mile)	$3,275,011.63	
Betterments of Columbus Branch	16,423.49	
Payments in excess of income	4,340.77	
Paid owners (one-half to each)	80,000.00	
Cash and balances due	27,888.65	
		3,403,664.04

The mileage of engines was: Passenger, 90,523; freight,

212,343; construction, 33,190; switching, 59,758; total, 395,814 miles. The earnings for the year were as follows:

	1876-77	1875-76	Inc. or Dec.	P. c.
Passengers	$148,567 96	$193,535 93	Dec.. $44,967 97	23.2
Freight	289,492 80	263,089 43	Inc.. 26,403 37	10.0
Express and Mail	24,066 59	22,260 98	Inc.. 1,805 61	8.1
Minor sources	5,470 08	12,571 92	Dec. 7,101 84	56.4
Total	$467,597 43	$491,458 26	Dec . $23,860 83	4.9
Working expenses	315,841 97	337,834 18	Dec.. 21,992 21	6.5
Taxes	14,736 55	13,972 09	Inc.. 764 46	5.5
New rails	36,494 46	18,563 86	Inc.. 17,930 60	96.4
Total	$367,072 98	370,370 13	Dec.. $3,297 15	0.9
Net earnings	$100,524 45	$121,088 13	Dec.. $20,563 68	17.0
Gross earn. per mile..	2,800 00	2,942 80	Dec.. 142 80	4.9
Net " "	602 00	725 00	Dec.. 123 00	17.0
Per cent. working expenses	67.55	68.74	Dec. 1.19	1.7
Per cent all exps	78.50	75.36	Inc.. 3.14	4.2

The decrease in passengers was both in local and through business and was due to the absence of the large emigrant travel of the preceding year. Local freights showed a decrease, owing to poor crops, but there was a large increase in through freights, especially east-bound freight. The increase in iron laid was made necessary by the faster time of trains.

The income account from June 1, 1875, to Aug. 31, 1877, was as follows:

Net income		$207,701 44
Betterments of Columbus Branch	$22,940 75	
Paid Central R. R. Co., of Georgia	92,500 00	
Paid Georgia R. R. Co	92,500 00	
		207,940 75
Excess of payments, balance to 1878		$239 31

Sixteen miles of new rails were laid as ordinary renewals; in addition 10 miles of new T rail were laid on the Columbus Branch to fit it for the running of the fast mail train, leaving only three miles laid with old chair rails and six miles of flange rails on stringers. Masonry piers have been erected for several bridges; one new iron bridge replaces an old trestle; some trestle-work has been filled in and some rebuilt. Two new depots, two new water stations, three new turn-tables have been built, and a number of minor improvements made.

Evansville & Terre Haute.

This company, known until a few months since as the Evansville & Crawfordsville, owns a line from Evansville, Ind., northward to Terre Haute, 109 miles, with the Rockville Division from Terre Haute northeast to Rockville, 23 miles. The Rockville Division is not worked by the company, being leased to the Logansport, Crawfordsville & Southwestern. The twenty-third annual report covers the year ending Aug. 31, 1877.

The equipment consists of 20 engines; 10 passenger and 5 baggage, mail and express cars; 426 freight cars; 1 pay, 12 construction and 52 hand cars. One old light engine was broken up during the year; 3 freight and 2 construction cars (one a crane-car) were added to the equipment, and one baggage and 15 freight cars built to replace old ones broken up.

The general account is as follows:

Common stock and scrip		$1,020,307 11
Preferred stock		100,000 00
Total stock ($8,487 per mile)		$1,120,307 11
Bonds ($8,053 per mile)		1,063,000 00
Earnings invested in construction		967,079 24
Balance of income account		165,236 62
Accounts and balances due		14,832 11
Total ($25,231 per mile)		$3,330,455 08
Construction, equipment and real estate ($23,917 per mile)	$3,156,970 83	
Stocks owned	18,000 00	
Fuel and Materials on hand	40,727 19	
Cash, and accounts receivable	114,757 06	
		3,330,455 08

The amount of stock and scrip was decreased by $24,408.01; that of bonds by the purchase of $500 for the sinking fund. Of the bonds outstanding $918,000 are secured on the Main Line and $145,000 on the Rockville Division.

The work done was as follows:

	1876-77.	1875-76.	Inc. or Dec.	P.c.
Train mileage, passenger	146,222	146,921	Dec.. 699	0.5
Train mileage, freight	151,063	140,124	Inc .. 10,939	7.8
Train mileage, service	23,915	76,378	Dec.. 2,623	3.4
Train mileage, switching	49,840			
Total	371,040	363,423	Inc .. 7,617	2.1
Mileage of freight cars	2,616,833	2,521,432	Inc .. 95,401	3.8
Passengers carried	122,485	130,269	Dec.. 7,784	6.0
Passenger mileage	4,102,386	4,176,602	Dec.. 74,216	1.8
Tons freight carried	235,308	221,833	Inc .. 13,475	6.1
Tonnage mileage	16,900,000	.....	.....	...
Av. pass. train load, No	28.6	28.43	Dec. 0.37	1.3
Av. freight train loads, tons	111.87	.....	.....	...
Av. receipt per pass. per mile	3.60 cts.	3.83 cts.	Dec. 0 23 ct.	6.0
Av. receipt per ton per mile	1.83 "	.....	.....	...

Of the freight car mileage, 25.7 per cent was of empty cars.

The earnings for the year were:

	1876-7.	1875-6.	Inc. or Dec.	P. c.
Passengers	$147,201 45	$162,124 32	Dec.. $14,922 87	9.2
Freight	308,577 60	302,832 80	Inc .. 5,744 80	1.9
Mails, express, etc	21,831 56	26,834 78	Dec.. 5,003 22	18.7
Rents	18,316 86	18,948 16	Dec.. 631 30	3.3
Total	$495,827 47	$510,740 06	Dec.. $14,812 59	2.9
Expenses and taxes	350,215 87	351,578 04	Dec.. 1,362 17	0.4
Net earnings	$145,711 60	$159,162 02	Dec.. $13,450 42	8.4
Gross earn. per mile..	4,549 79	4,685 69	Dec.. 135 90	2.9
Net earn. per mile....	1,336 80	1,460 20	Dec.. 123 40	8.4
Per cent. of expenses.	70.62	68.84	Inc .. 1.78	2.6

One dividend of 2 per cent. was paid, and the balance remaining after paying interest, etc., was enough to pay another in November, The income account may be condensed as follows:

Net earnings		$145,711 60
Real estate		764 58
Capital stock		26 25
Old engines sold		1,800 00
Total		$148,302 43
Interest paid	$82,234 06	
Bond purchased	500 00	
May dividend, 2 per cent	20,314 00	
Construction (sidings, etc.)	7,333 49	
Equipment	1,987 63	
Advanced to St. Louis & S. E. for right of way for connecting track at Evansville	9,740 00	
Sundry items charged to profit and loss	6,078 96	
		128,188 14
Balance		$20,114 29

This balance is represented by a decrease of $19,029.45 in liabilities, and an increase of $1,084.84 in supplies on hand.

During the year 151 tons of steel, 787 tons rerolled iron, 46,802 ties and 2,138 car-loads of gravel were used in repairs. There are still in the track 30 miles of the rails first laid, which, with 10 miles of English rails since laid, will need renewal within three years. Two iron bridges with stone abutments and several stone culverts have replaced wooden structures. White River bridge was thoroughly repaired. There were built 2,400 feet new sidings, several small station buildings and a good deal of fencing.

But one casualty occurred during the year, a brakeman having been killed by falling from a train.

Louisville & Nashville.

We published recently from advanced copies the President's report and general balance sheet for the year ending June 30, 1877. The full report reaches us this week, and we extract therefrom the profit and loss account for the year and a number of statistics from the elaborate and valuable "Table of General Results of Operations," which concludes the report.

The profit and loss account for the year is as follows:

By amount of account June 30, 1876		$2,653,380 48
Credits during the year		3,812 78
Gross earnings, per Table No. 3, this report		3,859,957 04
Gross earnings, N. & D. R. R., per Table No. 3, this report		679,591 61
Total		$7,196,741 91
Running expenses, L. & N. R. R. and branches	$2,184,116 58	
Interest account	1,025,903 28	
Discount on ten-year bonds	49,352 74	
Running expenses, N. & D. R. R	416,746 24	
Interest account, N. & D. R. R	150,184 12	
Hire of cars and engines, N. & D. R. R	37,000 87	
Dividend account, N. & D. R. R	98,553 44	
Sundry charges, N. & D. R. R	15,150 59	
Dividend No. 22, payable Aug. 10, 1877	135,054 00	
		4,112,061 86
Balance to credit, June 30, 1877		$3,084,680 05

The interest account item is, apparently, the balance of that account, as its amount is less than the annual interest charge on the outstanding bonds.

The extracts from the table of general results of operations are given herewith. On the Bardstown and Glasgow branches only mixed trains were run; on the Richmond Branch a separate passenger and freight train for seven months and for five months a mixed train only. The Cecilian Branch was worked for 5¾ months only, a separate passenger and freight train being run for one month, and a mixed train only for the rest of the time.

Louisville & Nashville R. R.—General Results of Operation.

YEAR ENDING JUNE 30, 1877.

	Main Stem.	Knoxville Branch.	Clarksville Div.	Memphis Div.	Nash. & Dec. Div.	S. & N. Ala. R. R.	Bardstown Branch.	Richmond Branch.	Cecilian Branch.	Glasgow Branch.	Entire Line.
Length of road, miles	185.0	109.9	128.4	130.7	122.3	183.0	17.3	33.8	45 5	10.5	966.4
Cost of road and equipment	10,812,050	4,410,095	3,739,364	3,905,558	4,118,023	10,013,416	229,424	831,487	.....	200,000	38,259,418
Cost of road per mile	58,444	40,128	29,123	29,882	33,671	54,718	13,262	24,600	.....	19,048	41,546
Train miles, passenger	416,942	64,447	176,394	207,839	176,786	269,017	5,739	17,760	9,592	8,388	1,352,854
" " freight	627,590	80,344	189,400	163,711	189,197	326,083	5,493	13,142	6,698	8,336	1,609,994
" " total	1,044,532	144,791	365,794	371,550	365,983	595,100	11,232	30,902	16,290	16,674	2,962,848
Miles of passenger train cars	2,322,837	231,870	893,891	1,018,496	730,925	1,151,503	32,626	56,593	33,158	20,536	6,492,435
Average number of passenger train cars per train	5.57	3.60	5.07	4.90	4.13	4.28	2.84	3.19	3.45	1.23	4.78
Total dead weight per passenger train tons, including engine	175.87	117.96	167.29	159.13	144.61	147.22	103.93	109.37	115.91	64.87	157.41
Total net weight per passenger train, tons	6.46	5.76	5.72	5.07	3.52	2.36	2.68	3.61	1.76	0.95	4.79
Percentage of paying to dead weight, exluding engine	5.24	8.50	5.04	4.64	3.84	2.50	4.97	6.10	2.69	4.34	4.55
Passengers carried one mile	17,312,191	2,477,662	4,757,072	6,201,299	4,788,136	5,483,240	233,349	337,988	168,029	130,290	41,859,256
Av. No. passengers carried in one passenger car	10.49	15.13	7.64	8.13	8.67	6.18	10.63	8.15	10.00	7.71	8.84
Av. No. passengers carried per train	41.54	37.97	26.97	29.84	27.05	20.33	20.30	19.07	17.50	7.86	30.85
No. of tons of passengers carried one mile	1,298,414	183,575	356,780	465,097	359,110	411,243	17,501	25,349	12,602	9,771	3,139,442
No. of tons of baggage carried one mile	432,805	61,192	118,927	155,032	119,703	137,081	5,834	8,450	4,201	3,257	1,046,482
No of tons of express carried one mile	700,365	119,010	390,412	360,199	117,91	68,523	7,039	28,270	.....	2,311	1,793,033
No. of tons of mail carried one mile	261,592	8,576	143,794	73,243	25,088	21,682	243	1,880	.....	351	536,449
Mileage of freight cars, empty	2,203,771	498,715	735,537	697,846	703,439	1,465,26.	11,903	43,287	11,449	4,618	6,375,825
Mileage of freight cars, loaded	10,825,747	853,905	2,944,992	2,132,958	3,004,860	3,893,536	27,506	71,469	26,646	14,054	23,796,673
Mileage of freight cars, total	13,029,518	1,352,620	3,680,529	2,830,804	3,708,299	5,358,796	39,409	114,756	38,095	18,672	30,171,498
Av. No. freight cars per train, loaded	17.25	10.63	15.55	13.03	15 88	11.94	2.45	5.44	3.98	0.85	14.78
Av. No. freight cars per train, loaded and empty	20.76	16.84	19.43	17.29	19 60	15.43	3.51	7.09	5.69	1.12	18.74
Tonnage mileage of freight	88,704,977	6,766,385	23,662,141	17,847,853	27,285,410	36,919,396	189,243	498,260	157,517	82,905	202,114,027
Percentage of paying to dead weight, freight, excluding engine	80.09	58.85	75.63	74.18	86.56	81.05	56.49	51.08	99.25	25.60	78.81
Av tons of freight per car	6.81	5.00	6.43	6.31	7.36	6.69	4.80	4.34	4.13	4.44	6.70
Av. net weight per freight train, tons	141.34	84.21	124.93	109.09	144.22	113.22	16.85	37.91	28.52	4.98	126.16
Av. dead weight per freight train, exluding engine	176.47	143.11	165.18	146.98	166.60	139.69	29.82	74.22	48.3a	9.52	159.29
Av. gross weight of freight trains, including engine	379.91	288.12	352.30	316.30	373.12	315.21	145.43	172 93	122.36	57.50	346.78
Earnings of passenger trains	$667,353	$101,831	$206,876	$267,258	$193,910	$206,086	$9,209	$14,366	$7,886	$6,727	$1,681,502
Earnings of freight trains	1,511,899	200,041	343.147	338,207	479,635	538,889	10,752	14,857	7,907	10,370	3,455,704
Miscellaneous earnings (rents, etc.)	153,010	1.012	2,115	1,856	6,047	13,707	109	166	100	.....	178,121
Gross earnings	2,332,262	302,885	552,137	607,321	679,592	758,682	20,070	29,389	15.893	17,096	5,315,327
Gross earnings per mile of road	12,607	2,756	4,300	4,647	5,557	4,146	1,160	870	346	1,628	5,500
Earnings per train mile, passenger, cts.	160.059	158.008	117.257	128.599	109.68	76.607	81.992	80.891	82.217	40.342	112.43
Earnings per train mile, freight, "	240.905	248.981	181.176	206.588	253.511	165.261	95.725	113.047	118 057	62.190	214.64
Ne earnings of passenger trains	$292,419	$33,112	$50,508	$56,747	$23,151	*$12,598	$398	*$4,474	$1.733	*$886	$440,109
Net earnings of freight trains	757,970	94,186	139,610	99,316	233,648	196,748	3,057	*10,204	3,095	4,864	1,522,290
Net earnings, including miscellaneous	1,205,399	128,310	192,232	187,919	262,845	197,856	3,564	*14,512	4,928	3,978	2,140,520
Net earnings per mile of road	6,505	1,168	1,497	1,208	2,149	1,081	206	.....	107	379	2,251
Net earnings per train mile, passenger, cents	70.134	51.378	28.633	27.303	13.096	*4.683	6.931	*25.192	1.807	*10.626	32.532
Net earnings per train mile, freight, cents	120.775	117.229	73.712	60.669	123.494	60.337	55.644	*77.613	46.209	58.349	94.552
Earnings per passenger per mile, cents	3.26	3.37	3.32	3.61	3.53	3.24	3.42	3.51	3.12	4.19	3.37
Earnings per ton of freight per mile, cents	1.704	2.956	1.450	1.895	1.758	1.460	5.682	2.982	5.020	12.510	1.709
Percentage of passenger expenses to earnings	56.18	67.48	75.58	78.77	88.06	106.11	95.68	131.14	78.0	113.17	73.83
Percentage of freight expenses to earnings	49 86	52.92	59.31	70.63	51.29	63.49	71.57	168.68	60.86	53.09	55.95
Percentage of all expenses to gross earnings	48.42	57.64	65.18	74.60	61.32	73.92	82.24	149.38	68.99	76.73	59.73
Cost per car mile in passenger trains, cents	16.141	29.637	17.493	20.669	23.362	18.991	27.001	33.291	18.556	37.068	19.121
Cost per passenger mile, without baggage	1.63	1.88	2.42	2.59	2.77	3.14	2.52	3.96	1.83	4.94	2.23
Cost per passenger mile, with baggage	1.76	2.18	2.63	2.82	3.05	3.43	2.72	4.42	2.47	5.20	2.93
Cost per car mile in freight trains, loaded cars	6.96	12.39	6.91	11.20	8.18	8.79	27.98	35.06	18.06	39 17	8.12
Cost per car mile in freight trains, all cars	5.78	7.83	5.53	8.44	6.63	6.38	19.53	21.84	12.63	20.49	6.48
Cost per gross ton per mile in freight trains, excluding engine	0.3779	0 5795	0.3704	0.5700	0.4183	0.4149	1.4679	1.7006	1.5218	1.3837	0.4216
Cost per net ton per mile in freight trains	0.827	1.563	0.860	1.339	0.902	0.921	4.014	5.030	3.055	6.641	0.957
Cost per net ton per mile in freight trains, including interest at 7 per cent. on cost of road	1.265	4.096	1.433	2.014	1.448	1.967	8.315	10.000	.....	15.084	1.633
Cost per net ton per mile in passenger trains, including interest at 7 per cent. on cost of road	23.11	55.79	27.98	34.49	49.85	83.87	55.01	81.77	.....	93.13	36.95
Cost per passenger per mile, with baggage, including interest at 7 per cent. on cost of road	2.92	6.76	4.73	4.88	5.52	8.41	5.38	12.29	.....	9.89	5.22

* Loss.

The Minor Connecticut Railroads in 1876.

Name of Road.	Property. Miles of road	Locomotives	Passenger train cars	Freight and other cars.	Liabilities. Stock	Funded debt	Other debt	Traffic. Train mileage	Passenger mileage	Tonnage mileage	Receipt per passenger per mile.	Earnings. Earnings	Expenses	Net earnings	Earnings per mile	Per cent. of expenses.
					$	$	$				Cts.	$	$	$	$	
Connecticut Central*	27.3	..	..	..	275,500	262,500	37,050	3,146	19,264	12,915	3.2	3,510	2,055	1,455	173	58.5
Danbury & Norwalk	33.8	7	11	77	60,000	500,000	.....	106,700	2,521,678	960,977	3.1	173,478	92,210	81,268	5,132	53.2
New Canaan	8.3	2	1	...	164,050	75 000	20 861	18,012	269,804	42,800	3.9	18,466	13,440	5,026	2,225	72.8
New Haven & Derby	13.0	4	4	30	455,700	525,000	75,000	42,210	687,541	449,178	3.7	89,437	57,948	31,489	6,880	64.8
New London Northern	100.0	22	26	273	1,500,000	682,000	183,288	490,546	5,899,360	10,729,982	3.5	508,902	348,282	160,620	5,089	68.4
Norwich & Worcester	66.4	21	15	749	2,597,800	550,000	165,732	379,469	7,280,926	10,201.872	3.4	758,670	446,705	311,965	11,426	58.9
Shepaug	32.3	3	2	38	294,000	400,000	40,923	39,579	289,026	352,702	4.0	40,601	29,474	11,127	1,258	72.6

* In operation only part of year; equipment leased.

The table includes only those roads whose reports have not been otherwise given. The Danbury & Norwalk paid 6 per cent. dividends; the New London Northern, 8 per cent., and the Norwich & Worcester 10 per cent. The New London Northern is leased by the Central Vermont; the Norwich & Worcester is worked by the New York & New England temporarily, under the old lease to the Boston, Hartford & Erie. The reports are for the year ending Sept. 30, 1876.